F·A·A·M facility for airborne atmospheric measurements

FLIGHT FOLDER

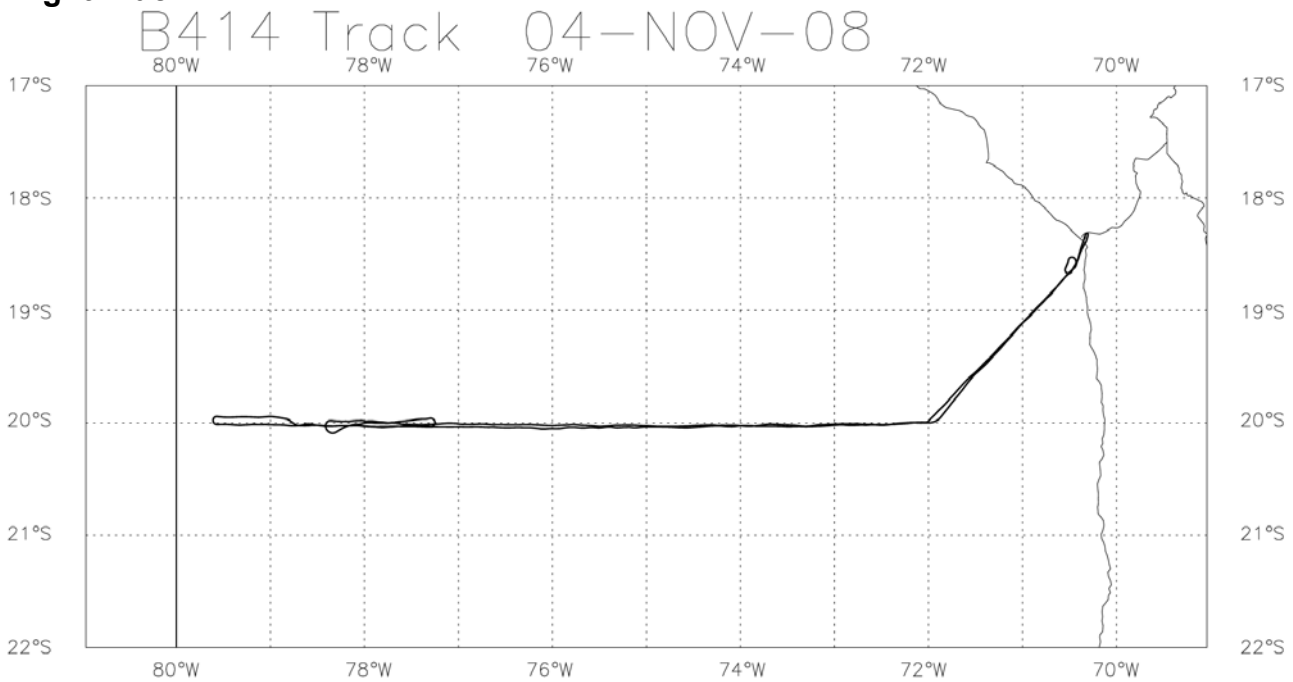
Flight No.	B414
Date:	04 Nov 2008
Take Off:	09:44:48
Landing:	15:04:04
Flight Time	5h 19m 16s

Campaign: VOCALS – 20 south task

Operating Area: S.E. Pacific Ocean off the coast of northern Chile

POB	Position	Name	Institute	Logs y/n
1	Captain	Alan Foster	Directflight	
2	Co-pilot	Ian Ramsay-Rae	Directflight	
3	CCM1	Jackie Mullholland	Directflight	
4	Mission Scientist 1	Paul Barrett	Met Office	
5	Mission Scientist 2	Phil Brown	Met Office	
6	Flight Manager	Jim Crawford	FAAM	
7	Core Chem / AVAPS	Doug Anderson	FAAM	
8	Cloud Physics	Martyn Pickering	Met Office	
9	SWS/SHIMS	Debbie O'Sullivan	Met Office	
10	CCN	Guy Gratton	FAAM	
11	ARIES	Stuart Rogers	Met Office	
12	MARSS	Jeff Norwood-Brown	Met Office	
13	Mission Scientist 3	Keith Bower	Manchester University	
14	Wet neph / PSAP / Neph / filters	Dave Tiddeman	Met Office	
15	VACC	Mark Bart	Leeds University	
16	Manchester cloud / AMS / SP2	Jonny Crosier	Manchester University	
17	CVI	James Bowles	Met Office	
18				
19				

Flight Track:



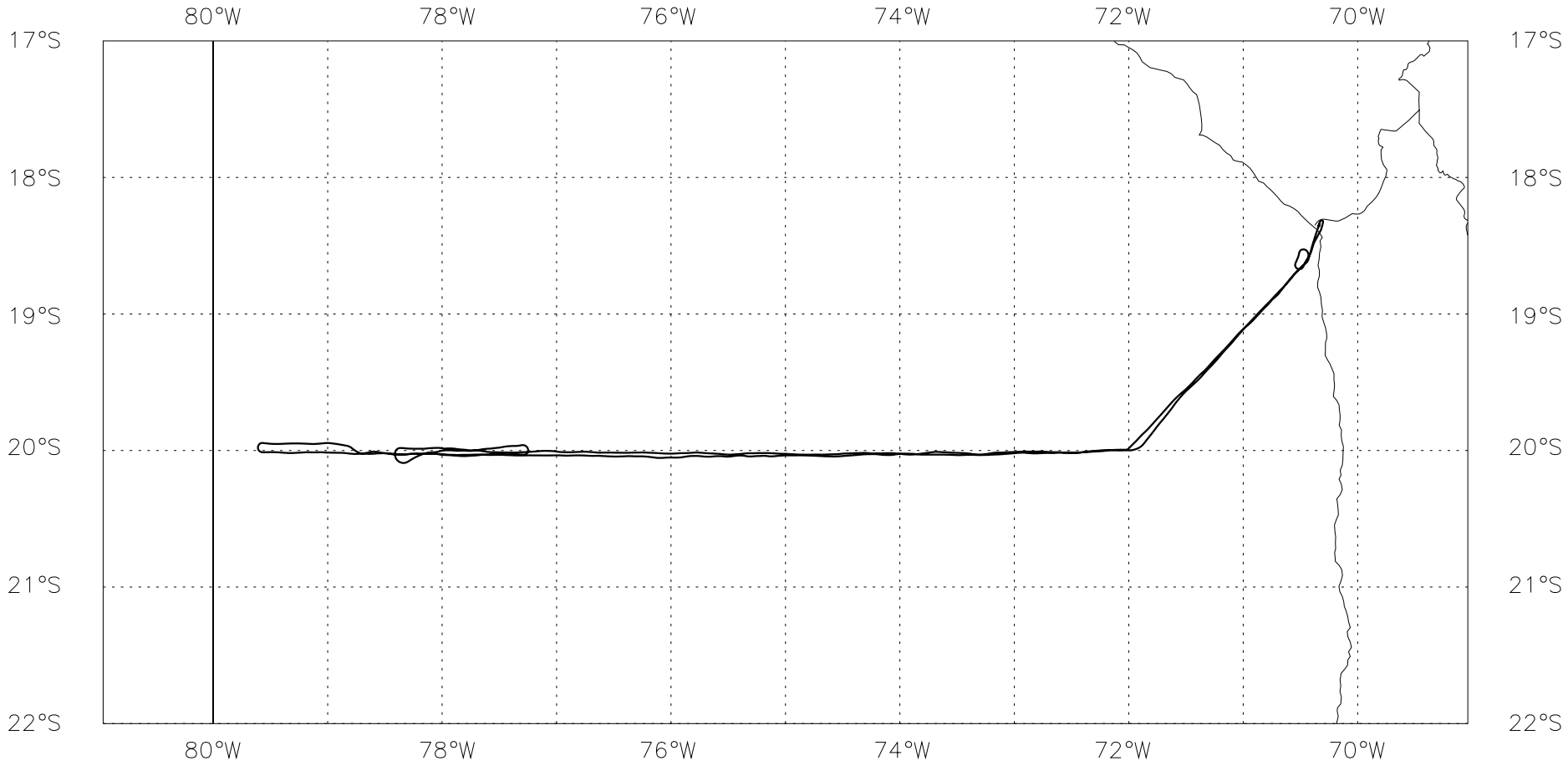
FLIGHT SUMMARY

Flight No B414
Date: 4 November 2008
Project: VOCALS
Location: 20 South over Pacific Ocean off north Chile coast

Start Time	End Time	Event	Height (s)	Hdg	Comments
091804		gin	0.08 kft	023	on
093852		ASP	0.08 kft	314	open
094448		T/O	0.05 kft	199	Arica
094448	095121	Profile 1	0.40 - 6.0 kft	201	start as t/o 6000ft
095121	100334	Run 1	6.0 kft	220	start as end P1
095222		nev	6.0 kft	221	zero
095340		JW	6.0 kft	227	zero
095512		heimann	6.0 kft	225	cal 09
100334	101028	Profile 2	6.0 - -.05 kft	227	50ft qnh1017
100637		!	3.0 kft	227	cloud top
100651		!	2.8 kft	225	at 3100ft
100725		!	2.2 kft	230	cloud base 2400
101028	101130	Profile 3	-.05 - 0.39 kft	229	50ft qnh1017 500ft
101130	102138	Run 2.1	0.39 - 0.44 kft	229	500ft
101242		JW	0.38 kft	225	zero
102042		!	0.39 kft	227	qnh 1018
102138	102236	Profile 4	0.44 - 1.4 kft	270	
102236	102719	Run 2.2	1.4 kft	268	
102257		!	1.4 kft	268	1500ft
102328		nev	1.4 kft	267	zero
102341		JW	1.4 kft	264	zero
102720	102850	Profile 5	1.4 - 2.9 kft	267	
102850	103416	Run 2.3	2.9 kft	272	
102941		r2.3	2.9 kft	266	3000ft cloud base 2700ft
103416	103620	Profile 6	2.9 - 4.8 kft	272	
103535		!	4.2 kft	269	tops 3900ft
103620	104650	Run 2.4	4.8 - 4.9 kft	269	
103654		r2.4	4.9 kft	268	5000ft
104650	105345	Profile 7	4.9 - -.08 kft	273	50 ft qnh1019
105346	105436	Profile 8	-.08 - 0.38 kft	273	50 ft qnh1019
105436	110439	Run 3.1	0.38 - 0.36 kft	269	
105513		r3.1	0.44 kft	268	500ft
110439	110752	Profile 9	0.36 - 3.6 kft	269	
110752	111811	Run 3.2	3.6 - 3.4 kft	265	
110830		!	3.5 kft	263	r3.2 reset to 3600ft
111812	111920	Profile 10	3.4 - 4.4 kft	273	
111920	113002	Run 3.3	4.4 - 4.5 kft	272	
111946		r3.3	4.4 kft	267	500ft above cloud
112404		heimann	4.5 kft	276	cal 06
113002	113559	Profile 11	4.5 - -.08 kft	274	50ft qnh 1019
113600	113644	Profile 12	-.10 - 0.33 kft	267	50ft qnh 1019
113644	114649	Run 4.1	0.33 kft	270	
113818		heimann	0.33 kft	267	cal 09
113830		r4.1	0.33 kft	266	500ft
113856		JW	0.34 kft	266	zero check
113910		nev	0.38 kft	267	zero check
114649	115119	Profile 13	0.33 - 4.0 kft	267	
115119	120126	Run 4.2	4.0 kft	271	
115212		p13	4.0 kft	269	pop up above to check cloud top
120127	120235	Profile 14	4.0 - 4.9 kft	262	
120236	121509	Run 4.3	4.9 kft	271	
121509	121604	Profile 15	4.9 - 5.4 kft	270	
121618	123034	Run 5.1	5.4 kft	274	
121916		r5.1	5.3 kft	091	C130 run start: 1 mile south of C130 track
123035	123157	Profile 16	5.4 - 4.2 kft	093	
123157	124146	Run 5.2	4.2 kft	087	
124146	124530	Profile 17	4.2 - 0.33 kft	096	
124531	125534	Run 5.3	0.33 - 0.38 kft	097	

124612		r5.3	0.34 kft	094	qnh 1020
125534	131626	Profile 18	1.1 - 23.0 kft	047	
131626	142508	Run 6	23.0 - 22.9 kft	058	
131924		Sonde 1	23.0 kft	082	
132508		Heimann	23.0 kft	092	cal 06
132943		Sonde 2	23.0 kft	098	
133950		Sonde 3	23.0 kft	091	
135015		Sonde 4	23.0 kft	093	
140040		Sonde 5	23.0 kft	096	
141113		Sonde 6	23.0 kft	088	
142121		Sonde 7	22.9 kft	090	
142508	150403	Profile 19	22.9 - 0.07 kft	039	Arica
144309		p19	7.0 kft	054	interrupted fl070
144931		P19	6.9 kft	359	restarted
145221		P 19	5.0 kft	205	interrupt
145551		p19	4.9 kft	030	restart
150404		Land	0.07 kft	201	Arica
150631		ASP	0.07 kft	019	closed

B414 Track 04-NOV-08



Pilot: Alan Foster
NavData Cycle 2008-11 Expires: Thursday, 20 November 2008.
Scale: 1:4043660 (1 inch = 55.46 naut mi). Printed on 03 Nov 2008

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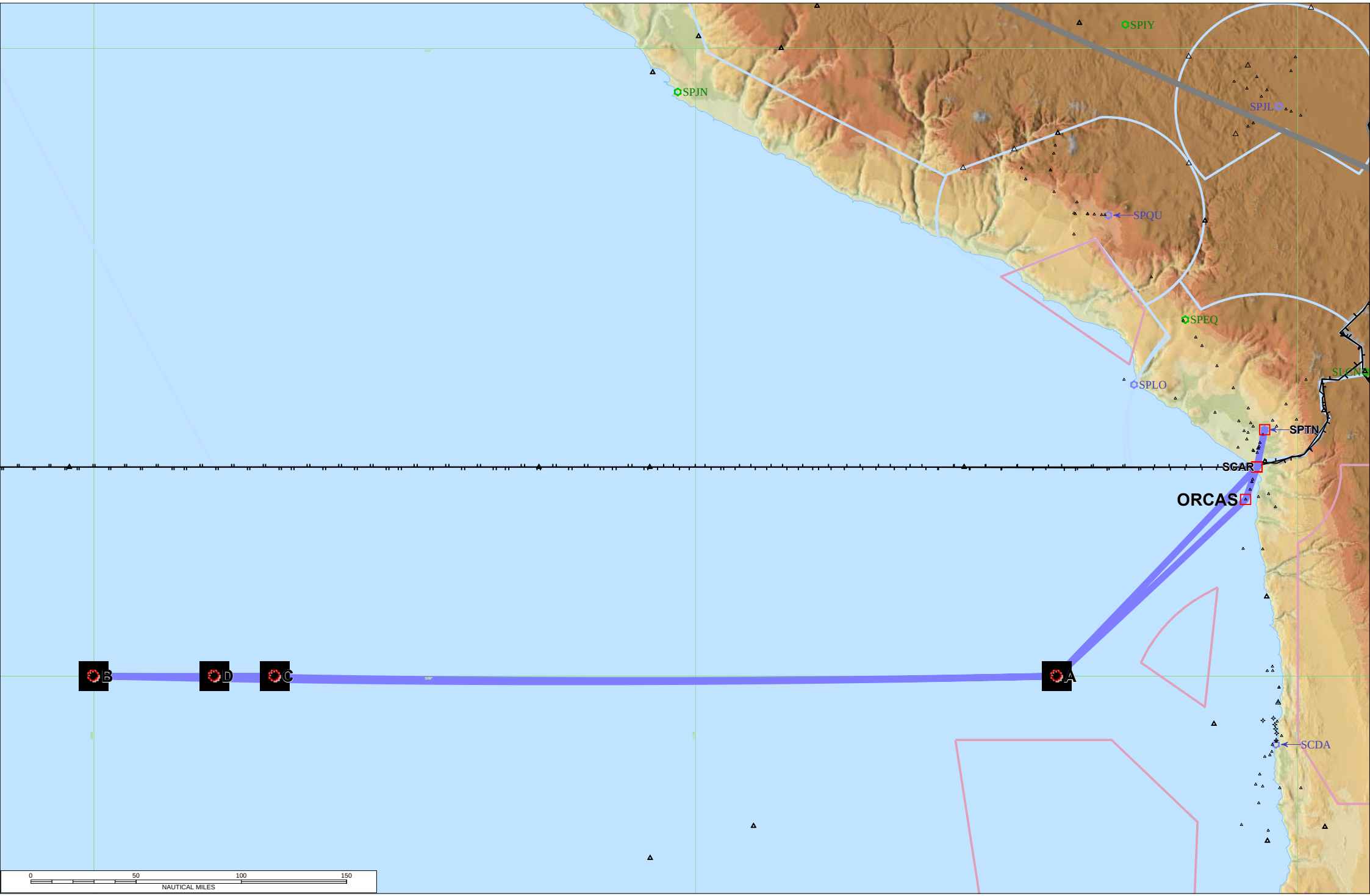


FAAM Sortie, Flight B414 - VOCALS 20ºS Cross-section #4
Tues 4th November 2008

T/O - 0645 local (0945 UTC) – to change to a later time only if C-130 T/O is delayed.
Landing ~1145 local (1445 UTC)

Mission Scientists: Paul Barrett, Phil Brown, Keith Bower

Operating Area: SE Pacific Ocean, off west coast of northern Chile, along lat line 20S

Waypoints: **ALPHA**: 72ºW 20ºS
BRAVO: 79º30'W 20ºS
DART Buoy 74º46.804'W 19º35.583'S

Sortie Objectives: To sample aerosol and Sc cloud as a function of distance from the coast to the pristine background (at times operating simultaneously with the Dornier 228 which will be remote sensing from FL150 - along same latitude) and to inter-compare in-situ cloud, aerosol and chemistry instruments/measurements with the C-130.

Weather: High pressure system off shore capping a marine boundary layer with widespread Sc cloud.

Detailed Flight schedule: PTO

Key Instrument Details:

SWS – as per instructions.
ARIES – as per instructions
CVI - During high level operate in aerosol mode with CVI hygrometer operating.
CVI – during in cloud runs operate in counterflow mode: **AMS** and **SP2** to sample from it
Wet Neph – operated during all of 500ft runs
Dropsondes – 1 per degree of longitude on high level return between BRAVO and ALPHA
AMS, SMPS, SP2 – to operate from Rosemount inlets during aerosol and high level runs and profiles; to operate on CVI during in-cloud runs.
Filters – to be exposed on below cloud runs at discretion of mission Scientist(s). Blank to be undertaken on high level return. The sample tube should be blown through before first filter cartridges deployed

FAAM Sortie, Flight B414 - VOCALS 20ºS Cross-section #4

Detailed Flight schedule:

1. Take off and profile ascent 1000 ft/min immediately to 6,000 ft amsl to check instrumentation

2. Continue towards ALPHA**,** beginning cycle below starting with immediate profile descent to 50ft.

3. Perform cycle consisting of a-i below

    a. profile descent to 50ft amsl,
    b. profile climb to 500ft amsl
    c. carry out 10 min straight and level run (SLR) at 500ft amsl
    d. * On first cycle only profile climb to 1500ft and carry out 3min SLR for CVI flow validation
    e. climb to 500ft below cloudbase (CB),
    f. carry out 10-min SLR at 500ft below CB,
    g. climb to 500ft below cloud top (CT),
    h. carry out 10-min SLR at 500ft below CT,
    i. profile ascent to 1000ft above CT.

4. At point ALPHA turn onto westerly heading and continue profile cycle as described.

5. Repeat item 3 until arrival at point near to BRAVO. Continue on straight and level course and following communication with C-130 turn onto easterly heading to come into formation with C-130 to begin intercomparison legs [T=2h 25m]

6. Carry out 10min SLR at 500ft above CT, then descend to a point in-cloud at FL to be advised by the C-130.

7. Fly 10-minute straight and level in-cloud trailing the C-130 by 5 minutes.

8. Descend to 500 ft below cloud and fly 10 minute straight and level run.

9. Ascend to FL230 and turn to head west towards BRAVO until reaching a point along 20S from which to return to ALPHA (chosen so as to make full use of remaining fuel). After first contacting G1 and Do228 on guard freq 123.45MHz to liase re: respective aircraft positions, begin to drop one sonde every 1 degree in longitude travelled towards ALPHA. NB no sondes to be dropped between point ALPHA and Arica on return.

10. Continue from point ALPHA to recover to Arica at FL230 as far as possible until approach into Arica and land [T=5h 00m]

Bae146 Mission Scientist Debrief **4 Nov 2008**

Flight B414 **20-Deg South Cross Section**

Paul Barrett

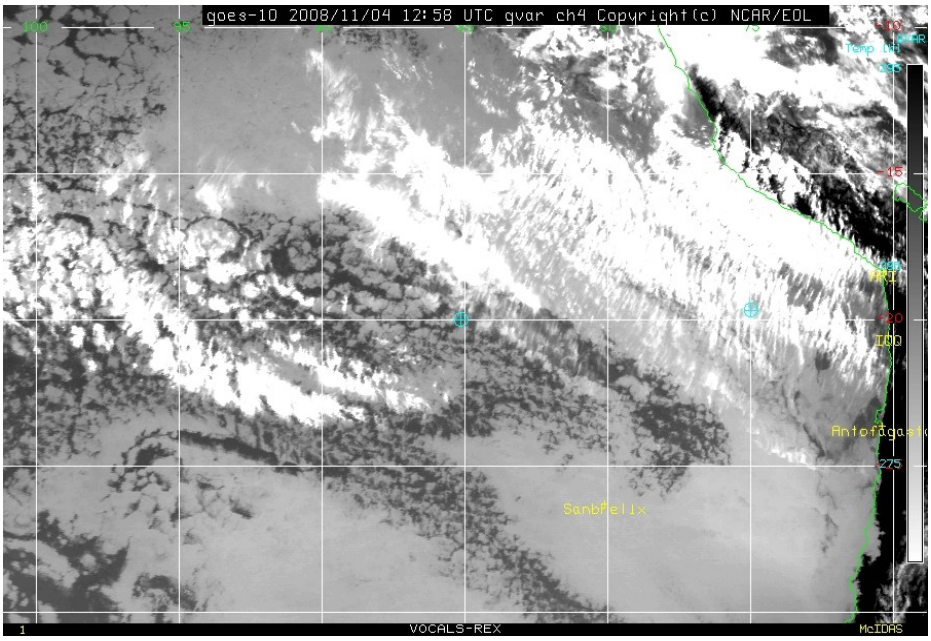
Way Points Alpha: 20.0S 72.0W

Bravo: 20.0S 79.5W

Take off 09:44 UTC

Land 15:04 UTC

Operating area: Southern Eastern Pacific ocean to the west of Arica, Chile



GOES-10 Thermal IR Image 1258UTC 4/11/08

Summary

A mission to characterise the stratocumulus along the 20S line, including sub cloud and above cloud legs. An intercomparison with the NCAR C-130 on three runs. Dropsondes dropped from 23kft every degree from 78 to 72 degrees west.

Weather Conditions

Stratocumulus was present across most of the operations area, except for a break in the cloud from just off the coast, and running a few miles out from the coast. The stratocumulus deck was not uniform across the area, and was very thin in places, and broken in places. A layer of cirrus clouds was present above, around 4/8 to 5/8 at the beginning of the sortie, rising to 8/8 in places on the return leg. In the early morning the cirrus layer was opaque in places, by the mid morning the layer was a cirro-stratus layer.

Points of Note

- Very light boundary layer winds. So very little turbulent transport, moisture flux.
- Cloud: LWC maximums generally approximately 0.5g/m3
- Drop concentrations fell away from the coast, 500 cc-1 near coast, to 350, then 200 near to 79W as given by FSSP (Manchester), CDP gave similar but with systematically lower concentrations, 250, 160, 135 cc-1. Mean droplet radius increase respectively.
- Some structure in the moisture profile in the boundary layer

- Very little drizzle was observed during the sortie
- The cloud was very thin, never more than about 1000ft. Cloud base did not vary smoothly as in previous 20S flights, but was much lower in places, and broken in others.-
- The particular case of the marine stratocumulus capped boundary layer topped by a cirrus layer as seen today may provide useful boundary conditions for a model study of the evolution of the boundary layer and the stratocumulus top.
- The boundary layer was well mixed *away from* the coast, towards 80 degrees. Closer to the coast the boundary layer showed signs of being decoupled, with small cumulus clouds forming below the stratocumulus. The cumulus did not seem to penetrate the tops of the stratocumulus

Mission Profile

Details

Profile climb from Arica to above the boundary layer, at 6kft.

Straight and level run (SLR) at 6kft – radiation measurements of the cirrus above. The Sc was not present below at the start of the run.

The aircraft turned at point alpha (72W 20S) and began to head west along 20S

Following this a series of runs was commenced.

- A profile to the surface (50ft) and back up to 500ft, to characterise the boundary layer.
- SLR at 500ft, to sample the sub cloud region.
- SLR in cloud. Cloud top and base estimates were taken from the previous profile.
- SLR above cloud with radiation instruments (SWS, ARIES) assessing the impact of the Ci on cloud top radiative balance
- Climbs between SLRs were all profile climbs (1000ft/min)

A total of three sets took places, until the most westerly point was reached.

The aircraft turned to head east, and climb to follow the track of the C-130 running 5 minutes ahead. Intercomparison runs were performed following the C-130 above cloud at ----ft, 4500ft in cloud and 500ft AMSL.

The BAe146 then climbed to 23kft heading west to reach 78 degrees west. The return along 20S saw a sonde dropped every degree on the degree until 72W. The NCAS Dornier228 DCALM was in the air close to the sonde at 76 degrees, and the G1 and the Twin Otter were also in the air along the same track during this sortie.

A profile descent was performed into Arica on recovery.

Instruments Issues

2DS – not much data recorded – redundancy exists in other instruments
PCASP – u/s – dirty optics, leak, concentrations far too high – can use CVI-PCASP out of cloud
Lower SHIMS – Low signal
Sondes – all data recorded, including GPS winds
CCN Rack – lost data from the first 30 minutes, software control issues(?), 'B' column is working 'A' column is u/s, No data from final climb after ~12kft, and no data on 23kft leg

MS1

Mission Scientist's Log

Flight No B/~~444~~... **Date** 4/11/20... **Name** P. BARRETT **Page** ...1... **of** ...7...

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
T/O 9:44:16					TAR – overcast, 8/8 Sc haze.
P	P1				cloud base @ 2.2kft
					cloud top @ 3?
					Some breaks,
09.56					line clearance of coastal Sc
09:59	R1	6.0kft			Ci above horizon
					edge of Sc visible on horizon
					small wisp of cloud in clear sky
					→ edge very well defined
					inversion at 3.0kft
					well mixed B.L.
					some structure (moisture) above cloud top N.V.
10:04					above Sc - thin Sc
					Clear Pockets visible - West
					consistent depth below inversion P1
10:11	P2				breaks too
					+ altitude + Pressure setting
					cloud top 3.1kft (1015)
					cloud base ~2.6kft
					Cu below
					non-uniform cloud base
					some drizzle on windscreen
1014	R2	500ft			(-13.0 22.55 80W
					POL - expected @ 12:15
					4500ft inclus

Mission Scientist's Log

Flight No B.H4. **Date** 4/11/08 **Name** P. BARRETT **Page** 2 **of** 7

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
	R24 (ctd)				till now - uniform cloud base.
					slight drizzle.
					P = 1018 clear above inplace
10:28					POINT X
	P4				≈
					≈ structure in Sc
	R22				CVI zero
					some cells are much lower than general base.
	P5				Cloud base ~2300 (lowest)
	R23				entered ~2700
					LWC ~0.05 g/m3
					out of cloud by 1/4
10:36:20	R24	5.0			above cloud (Sc)
					Sc = 8/8, Ci = 4/8 all streaky but broken
					some Ac - 6/8 above as well??
					Dust deposits on wind screen
				CDP	150-175 ϕ = 13 ⇒ 10 μm
					FSSP 350 ϕ = 14 ⇒ 10 μm
					Diseth ~ 5 to 10 μm
					Radiation Measurements
10:46:50	P7	5.0-0.5			Cbase Ctop = 4400 Cbase = 2900 (1318)
					LWC ~ 0.3 max = 0.4
					TL dewpoint structure at 960 hPa
					deeper looks well mixed
	P6	0.5-500			Sc 8/8

Mission Scientist's Log

Flight No B.414... **Date** 4/11/08..... **Name** P.BARRETT..... **Page** 3.... **of** 7...

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
105436	3.1	500			still thin cloud, some small breaks to sky
					21°23'580W 4.4
					Sat images — 1hr broken to 775W
110434					light winds — off set from CB track
	3.2	~~3800~~			Cloud base ~ 324ft
		3600			slight adjustment
					1
					80 75.09 W
					CCN - increase 350 - 500
					still cloud tops, some surface veg
					CDP 250 μ = 11μm
					FSSP 500 μ = 11μm
11:14:20	R3.3	4600			Thin cloud below, broken Sc/Cu above, all the way to horizon
					CCN - lower 50 200 - 300
					wind increase above inversion.
					hole in Sc below
					(boundary ahead, change in cloud height
	PM				Cloud Top = 4.1 (1019)
					CBase ~ 3.7 (1019)
	R2				
11.36.44	R4.1	Sweep			below broken Sc light wind
					some moisture in structure Slo cloud

Mission Scientist's Log

Flight No B 414 **Date** ..... **Name** PBARRETT **Page** 4 **of** .....

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
113649	P13	500 – 440			Profile through cloud
					cloud base = 4 scatterd
					Main base = 3650
					Cloud lo = 4.4
					CPC dropped to 250
11.51.14	R4.2	4.1kft			23 mins to RV 12.15
					10of 6.000ft 30.17
					2 nearly in cloud top
					FSSP 350 ϕ 14
					CDP 160 ϕ 15
					droz 3 l^{-1} 100μm
					CVI 15 cc^{-1} water not freezing
	P14				cloud top at 4.4
11:21:36	R4.3				above cloud
					Ci patchy above
					SC - solid below, hole above.
					C130 – CTop @ 4.5kft
12.19	S.1			intercomp	above cloud @ 5.5kft
					We are offset 1nm to the South
					R15 start of C-130 run
					M30A – descending
					Longitude = 07°47.4'
					Base 4300ft
					Onboard SC ahead

Mission Scientist's Log

Flight No B444 **Date** ..... **Name** P BARRETT **Page** 5 **of** .....

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
	P16				cloudtop (1019 3008) = 4.6kft
	R52				FSSP 200 $\bar{r}$ = 18μm
					CDP 125 → 150 $\bar{r}$ = 19μm
					Drizzle 10 l^{-1}
					CAS = Similar Size 15μm
					Conc = 400 cc^{-1}
					hitting cloud top
					0.1 LWC
					10-20 on PLASP CVI
					60 on CPC
					LWC – gw ~ 0.3
					N_t 0.24, 0.26
					78°06 cold air
					Same time - hitting cloud base
12.40					G1 2078
12.41	P17				Cbar 3700
					sunlight down to sea surface
					well mixed, no moisture structure to Sc
12.45.41	S3				77°14' - end of C1 30 interrupt
					Conc PCASP ~150 cc^{-1}
					All aircraft in the air
					C1, DCALM, C-130 TWO OTHER
12.58.34	P18				Cloud top ~4.2 kft

Mission Scientist's Log

Flight No B 414 **Date** 4/11/08 **Name** P. BARRETT **Page** 6 **of** 7

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
	P18				- dry aloft
					Pic 306 - taken 13001 6000 ft
					- Boundary - Rift?
					filled in - not re-opened??
13:16	Q6	23000			Sonde leg, all aircraft in ci
B1424					SONDE 1
					- Ci above, 3/8
					ahead Ci, Ci stratus, Altostratus
					- Pic 310 Ci solid ahead
132943					Sonde 2
					Pic 311 - apor structure.
					radiometer 1 min zenith before after sonde
					nadir rest of time
					B4 >>>
					2 layers above? - high Ci
					at the Ac? - could be thicker
					parts of the same layer.
					ir gas?
~~13:45~~	B45?				Pic 315, 316
14:00:40					Sonde 5 - 74°W less Ci above Pic 317
					Cu forming gaps between Sc Pic 318
14:11:13					Sonde 6 - 73° W

Mission Scientist's Log

Flight No B. 414 **Date** 4/11/08 **Name** PBARRETT **Page** 7 **of** 7

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
					Large rift in Sc to SE in towards coast — nothing in lee (Cu)
					PIC 314 
					Rift ahead, some Cu build up at this longitude
					~~Start drift on 11h~~
14.16				PIC	320 – Cu in rift, on 205
14.18				PIC	322 – rift edge, Ci above.
					Sonde 7, droped on rift boundary
14:21					
	P19				descend back into airc.
					moist layer on descent
		10000ft			Passing edge of Sc NSW
					Haze and low cld on trades.
					Convection in aline over distant mountains.
					Aerosol, H2O layer @ 20k
					Ci above airfield
					↳ No Pirouette as requested

MISS. SCI. 2

Mission Scientist's Log

Flight No B.414 Date 4/11/08 Name PHIL BROWN Page 1 of 4

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
0944		-			t/o ARI.
		1013 2700			cloud top. 5/8 Ci above.
0951		6000			clear area starts about
					here - quite extensive ahead.
095717		"	277		over Sc edge again.
					start P2.
100322		"			" "
—		9hPa 3100	1017		3000 cloud tops.
—					1/8 scuddy Cu below Sc
100928					end P2
1017	2.1	500			Still seems to be Cu below Sc
—					ahead.
102236	2.2	1500			R2.2 start for CVI cal.
102720					end.
102801		2100 ~~3550~~			Cu patch here.
		2700			in cloud.
102850	2.3	3000	W	~~72~~.5W	2.3 start
					2DC 5-101-1
103416		"			end 2.3 early. climb up.
103620	2.4	5000		73.W	2.4 streaks & dirt on screen from in cloud.
1044					CCN now OK.
104650		"		~~73~~ 42'W	2.4 end
		1018 4100			cloud top
105345		50'		~~74~~.2W	end P7 seems more well-mixed.
105436	3.1	500			start 3.1 176/5 ms^{-1}

Miss. Sc 2

Mission Scientist's Log

Flight No B. 414 **Date** 4/11/08 **Name** ..... **Page** 2 **of** 4

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
110439	3.1	500			end. c P9 to 3800.
					CCN 350-500 incr in
					counts.
110~~830~~	3.2	3600		~~75~~ 6.0W	cloud top at 3800
—					well mixed BL during climb
—					CDP 250 1/cm HF 500
1113					CVI low LWC - adjust cut.
—					2DC v. low drizzle.
1116					probably near cloud base (they top at this end of run.
111812	3.2				end 4100 top
111920	3.3	4600		75 48W	start 3.3 CCN 200-300
					305/8 ms^{-1}
1126					Heimann in cal as we cross broken cloud, but
—					probably seeing 1km to sfc.
					end 3.3
					4000 tops.
					3500 base.
—					Profile is cooler & drier than before
113559		50ft			end. P11
113644	4.1	500		76.9 W	start 4.1 but quite well-mixed. extra moisture
—					cel 500ft & below ?
					177/7 ms^{-1}
114449	4.1	"			end 4.1
		3650			base.
		4400			tops.

Mss. Sci 2

Mission Scientist's Log

Flight No B...414... **Date** ...4/11/08... **Name** ..... **Page** ...3... **of** ...4...

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
115119	4.2	4100			Start 4.2.
					C130 QNH 30.17
					MF 350 14 CDP 160 15
/					5 L^{-1} 100µm 2DC.
/					CDP clean spectra.
					Do228 at to 76W 100-150
120127	4.2	"			end 4.2 4400 tops.
120236	4.3	~~5~~000			start. still Ci above
					e drifting 4 mi N for separtn.
121618		5500 30.17	W		Run 5.1 250/3 ms^{-1}
1217					turning back E to follow C130
121856		"			in trail 1 mi S, just thro aerosol spike, exhaust plume.
					GPS alt 1700-1720 m
123035					end 5.1 e start descent
/					4600 ft tops 1328 m GALT for ± cloud.
123157		4300			Start 5.2 +/- 10 m fluctuation.
					5-10 L^{-1} 2DC 200µm
/					MF 200 18µm CDP 125-150 4µm
					CAS 400 clean spectra
/					CVI 0.1 gm^{-3} JW ~ 0.3
/					0.3-0.45 JW
124146		"	E	78W	end 5.2 3700 base.
124531		500			start 5.3. well mixed in descent.
					117 6 ms^{-1}
/					note large error in distance to AOSS offset

MS 2

Mission Scientist's Log

Flight No B.414 **Date** 4/11/08 **Name** ..... **Page** 4 **of** 4

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
	5.3	500			150 cm^3 CV1 PCASP
125534		//			end 5.3 & Profile 18 to FL230.
					4200 bops.
131626	6	FL230	060	79 12.0 W initially	end P18, run 6
131924		//	090	78 W	Sonde 1
1323				77. 30.0 W	broken cloud below.
					v. dry above inversn in P18,
—					GE wandering down slowly to ~50
—					270/17 ms^{-1}
132943				77 W	Sonde 2 good GPS.
133950				76 W	Sonde 3
135015				75 W	Sonde 4
140040				74 W	Sonde 5 270/12.
1411		//			broken cloud to N,
					variable cloud thickness.
141113				73 W	Sonde 6
142124				72 W	Sonde 7
142508	6	//	040		End 6, start P19
1431					solid cloud in near coast
—					region again.
1434					moist layer started at 550 hPa
					Lsea also in CAS.
143920		9100			clear below, again, aerosol layer just below.
144315		5000			hold P19
					shows in Neph.

1504 land 5h 19.

Mission Scientist's Log (MSci3)

(+ MAN CLOUD RACK OF 2)

Flight No **B.414.....** Date ...04/11/08 (K.N BOWER) Page 1 of 6

	GMT	Run / Profile	Height	Hdg	GPS Position	Remarks (clouds, weather, visibility, winds, sea state etc.)
	6:45:07	ICWB 4mile				T/O
						bit of SO_4 8 µg/m³ AIMS ✓
	09:44:48	P1 from T/O				CAS seeing a bit at start then drop down
						both AMS / AIMS out of BL
	09:49:40					Definite edge to Sc ~ 4000ft. up
						CAS in BL
	09: 51 21	P1 end/R1	6000	224	18°36/70°30	16.04°/-4.21°C 813mb 5m/s/161° (5.9kft)
						Broken below / Ci above
	09:57:22	R1	6000			at edge of next batch Sc (Cont)
	10:03:33	R1 end/P2	5.9kft	227	19°12/71°6	15.06°/-1.74°C 812mb 2m/s/179°
	10:06.40	P2	2.9kft	226	18°52/71°88	CT = ~ 3000ft 908mb 18.52/4.86 3m/s/211
	10.07.15	P2	2.3kft	231	19°24/71°18	CB = ~ 2400ft 929mb 11.94/12.41 5m/s/178
SOft	10:10:25	P2/P3 E S	0 kft	228	19.30/71.50	1014mb 18.02/15.54°C 7m/s/165°
500ft	10:11:31	P3 end/R2.1	0.3kft	229	19°30/71.30	C130 @ 22.55 '80 W in POC
						still expecting RV @ 12:15 UTC
						⇒ inbound legs @ 4500ft.
	10:20:16	R2.1				1018 pressure setting
	10: 21.40	R2.1/P4	0.4kft	269	19°54/72°0	Turned at ∝ Cont R2.1 start P4
1500ft	10:23.36	P4 end/R2.2	1.3kft	268	19°54/72°0	AMS → CVI 13.52°C/11.41° 965mb 3/199°
						Bimodal SMPS Spectrum
						Great AMS signal on CVI inlet.
	10					
1500ft	10:27:49	R2.2/P5	1.3kft	267	20°0/72°26	end R2.2 / start P5 964mb 13.25/10.82° 3m/s/238
3000ft	10:28.48	P5/R2.3	2.8kft	272	20°/72°30	end P5 start R2.3 in cloud
						913mb 8.82/9.76°C 0m/s

0.1 g/m³ FW, Nevzorov, CAS 0.15g/m³ ϕ=13µm
CAS LWC = 0.2g/m³

Mission Scientist's Log (MSci 3)

Flight No B.414 **Date** 04/11/08 **Name** K. N. Bower **Page** 2 **of** 6

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
10:32:52	R2.3	2.9kft	267	20°/72.42	911mb 8.58/9.13°C 2m/s/112
10:35					2DS crashed – rebooted – now works ✓
10.36.21	Pben/R2.4	4.8kft	269	20°/73°	846mb 19.01°C/10.46°C 7m/s/307°
				Captain	picked up marks on windscreen in cloud
					from clouds – streaks of dust on windscreen
					SWS- I might ignore for end of
					Will do 500ft leg after P down.
					towards Cu base through Sc – 1500ft
					run possible must be ....
					Core Cloud CDP – conc (150 - 175) ϕ (13→10)
					FSSP – conc (300-350) ϕ (4-10)
					drizzle ~ 5-2/l 100μm (not much)
					(Will stay on CVI inlet as Ae – rather than Rosemount inlet)
10:46:28	R2.4c/P5	4.9kft	273	20°/73°42'	846 mb 19.52/-1.02 8m/s/292°
					Charged ✗
10:49:07	P5	3800	269	20°/73°42'	CT – 4100 on 1018mb setting
10:49.30	P5	2600	271	20°/73°48'	CB ~ 2900 916mb 8.5/9.05°C 3m/s/174°
500ft 10.53 41	P5c/P6	0kft	273	20°/74°00'	Going to 500ft – CAS screen Dump (1015mb)
500ft 10 54.36	Pben/R3.1	0.3kft	269	20°/74°12'	999mb 15.16/9.08° 5m/s/177°
10:57.30					Dise'n VACC CAS screen 2nd marker
					3 μg/m³ total Conc onb 3.5-4/cm⁻³

Low Wind speed – little sea salt at all

Mission Scientist's Log (MSL3)

Flight No B. 414 **Date** 04/11/08 **Name** K.N. BOWER **Page** 3 **of** 6

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
					noisy in channel 1 – total ~300 cm⁻³
					but these ones 10× higher than should be,
					-2DS OK.
					-gated LWC on CIPS – clear is Ø
					C130 @ 21S 80W
500ft 11.04.53	R3.1e/P1	0.4kft	269	20°/74°48	997mb 15.04/9.52°C 4m/s/173°
					Switch AMS to CVI in prep for inclined
					run .....
					Got flow – no particles
					CPC 9
11.07.52	R3.2	3.6kft	265	20°/75°W	883mb 5.79/7.14°C 4m/s/187°
11.08.30	R3.2 start	3600	266	20°/75°6'	Start downrun – in CT's
					CDP 250 ϕ 11mm
					FSSP 300 ϕ 11–12
					CVI LWC ~0 3.2–4 particles/cm³
					such small drops even for ϕ C/Flow still
11.18.08	R3.2	3.4kft	273	20°/75°42'	893mb 5.52/7.01 5m/s/185
11.18 49	R3.2end/P10	3900	270	20/75°42'	877mb 5.35/5.91° 3m/s/175
11.19.21	P10/R3.3	4400	271	20/75°48'	500 ft above CT. clear air – AMS → Rose. (FLOWS)
					CPC ~ 200–300 cm⁻³
					PCASP ~ (missed it)
					PCASP Rock 15–20 "325/20kts Wind"

Mission Scientist's Log (MSci 3)

Flight No B. 414 **Date** 04/11/08 **Name** K.N. Bower **Page** 4 **of** 6

	Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
		R33				CAS < 0.1 cm^3
	11.29.58	R33 / P11	4.4kft	274	20°/76°24'	859mb 18°SC/-27.35°C 7m/s/312°
	11.30.43	P11	4000	275	20°/76°30'	CT (4.1kft MSL)
	11.31 25	P11	3400	270	20°/76°30'	CB (3.7 kft MSL)
						2.5μg m^3 SO$_2$
50ft	11.35.57	P11 cont / R2	0.0 kft	267	20°/76.48'	1016mb 16.2/8.57°C 5m/s/165°
500ft	11.36.41	P11 cont / R4.1	0.3kft	270	20/76'54'	1007mb 15.05/8.2°C 5m/s/165°
						Aerosol LW probe on CAS
						CIP white
						CAS ~ 2.5 cm^3
						Descending CT ~ 3800ft
	11.352				C130	21.34S 80W at 4500 ft
500ft	11.46.44	R4.1 cont / P13	0.3kft	267	20°/77°30'	1000mb 15.07/8.98° 7m/s/127°
	11.48ish					AMS → CVI only
	11.49.52	P13	3.5kft	267	20S/77'42'	CB 890mb 6.01°/6.63° 7m/s/174°
	11.50.26	P13	4.2kft	267	20S/77'48'	CT 868mb 4.53°/6.65° 6m/s/163°
	11.50.37	P13 / descent	4.4kft	268	20°S/77°48'	not called as probe down into Cloud Run
	11.51.17	descent / R4.2	3.9kft	270	20°S/77°46'	875mb 5.06°/10.06° 6m/s/155mb
						SO4 high on AMS Cross Beam 3
						CIP ✓ CAS ✓
						Cu Cloud FSSP ~ 350 ϕ 14 μm
						CDP ~ 160 ϕ 15 μm
						few drizzle ~ 3 g/l
						CAS 350–400 ϕ 14–15 μm
						CVI FLASH 15 counts/cc

5500 407 nm
C130

Mission Scientist's Log (MSci 3)

Flight No B 414 Date 04/11/08 Name K.N. Bower Page 5 of 6

TIME (GMT)	Run / Profile	Height	Hdg	GPS POSITION	REMARKS / OBSERVATIONS.
~~11.57 ish~~	~~R4.2~~				~~2DS crashed – rest – new mask – OK.~~
late → 12.01.36	R4.2/P14	4100	262	20°/78°30'	C7 still at 4400ft 872mb 4.79/2.07C
12.02.37	P14/R4.3	4800	271	20°/78°36'	pull duct off 2DS for a/c V/comparison
					3m/s/257
					130 α Ranee.
	R4.3cm/P15				
12.15.37	P15end/R5.1	5200	272	19°54'/74°24	833mb 15.89/-27.51°C 4m/s/185°
12.16.42	R5.1	5300	271	19°54/74°30	turning 831mb 15.82/-29.82 4m/s/192°
12.19 ish					Crossed Central C130 – CRC/VASC.
12.18.56	R5.1	5300	90°	20°/79°30	turn completed 830mb 15.33/-32.01°C 4/126°
12 30.30	R5.1/P16	5300	93°	20°/78°48'	R:24 C130 ↓ (going down)
12.31.54	P16	4400	89°	20°/78°42'	860mb 6.46°/-22.49° 7/128° [CT]
12 31.56	P16end/R5.2	4100	87°	20°/78°42'	(C7 ~ 4800 ceiling)
					CDS seems higher ones
					Core Cloud FSSP 200 ϕ=18μ
					CDP + 125–150 ϕ ~ 19μ
					W/l dry 200
					CAS 400 – peaking at 15μ
					CVI 0.1 g/m³ W-20 PCASP 60CR
					CAPS LWC 0.45 ish
1243ish					Switched AMS → Rose
12.41.51	R5.2/P17	4kft	96°	20°/78°	872mb 5.02/7.39° 6m/s/135°
12.45.31	P17/R5.3	5000ft			
12.55.32	R5.3/P18	5000ft	94	20°/77°18'	end i/c end R5.3 900mb 15.07/9.05°
12.57.					changing AMS to MS units for high level
13.16.26	P18end/P19	FL230	86°	20°/76°12'	hours and started to save "2DS data"

Mission Scientist's Log

Flight No B. 414 **Date** 4/11/08 **Name** K N. BOWER **Page** 6 **of** 6

	Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
DS1	13.19.22	R6	FL230	80	20°/78°	DS1 – good GPS signal
						D 228 heading West – need to look out for them
DS2	13.29.40	R6	FL230	99	20°/76°54'	DS2 (one in front) – GPS ✓
						G1 – v/c with C130 Soon.
	13.37.00	R6				seem to be under a thick Ci deck – Rad-vis
						ground vis is 1nm 'below/above'
DS3	13.39.68	R6	FL230	91	20°/76°	DS3 – good with DS2 in front
						(19S, 71W) – G1 – to join up with C130 at ∝
DS4	13 50 13	R6	FL230	93		C130 ETA 14.15 at ∝
					20°/75°	DS4
						14.20 – 14.25 G1 ETA ∝
DS5	14 00 36	R6	FL230	97	20°/74°	DS5
DS6	14.11.12	R6	FL230	88	20°/72°54'	DS6
DS7	14.21.19	R6	FL230	90	19°54'/72°	DS7
	14.25.04	Abeam/P19S	FL230	39	19°48'/71°42'	1041mb –15.68°/–40.03° 12m/s/274°
						layer at deck 15–13 kft – ↑ humidity
						↑ scattering – Nephs
	14:43:06	P19 Int	7kft	54	18°48'/70°42'	780mb 14.48/–1.23°C 1m/s/48°
						Another layer 6–8.5 kft.

packed out no cloud- drift As leg at bottom — heat & hist cloud — more
↓
— above cloud

prof down

Cycle — out & W point

land- NV C130

repeat 3 v/c with C130 5 mins behind

↑ FL230 → 76°W — dropsd sonde → 92°

Probably down & drift.

SC thin broken — Dew Cues ↓ as → W down sign ↑

Ci all way across

Int

VACC ✓
CVI - cncs with ↑

Filters ✓
Aers ✓
2DS CDPS ✓
lost some data

Core Chem mon variable in O3
CO

JW ✓
NEV ✓

Cloud Phys - bad in PCASP - drying again - needs a clean
- consensus data. — to need flight.
- Cloud Inst OK

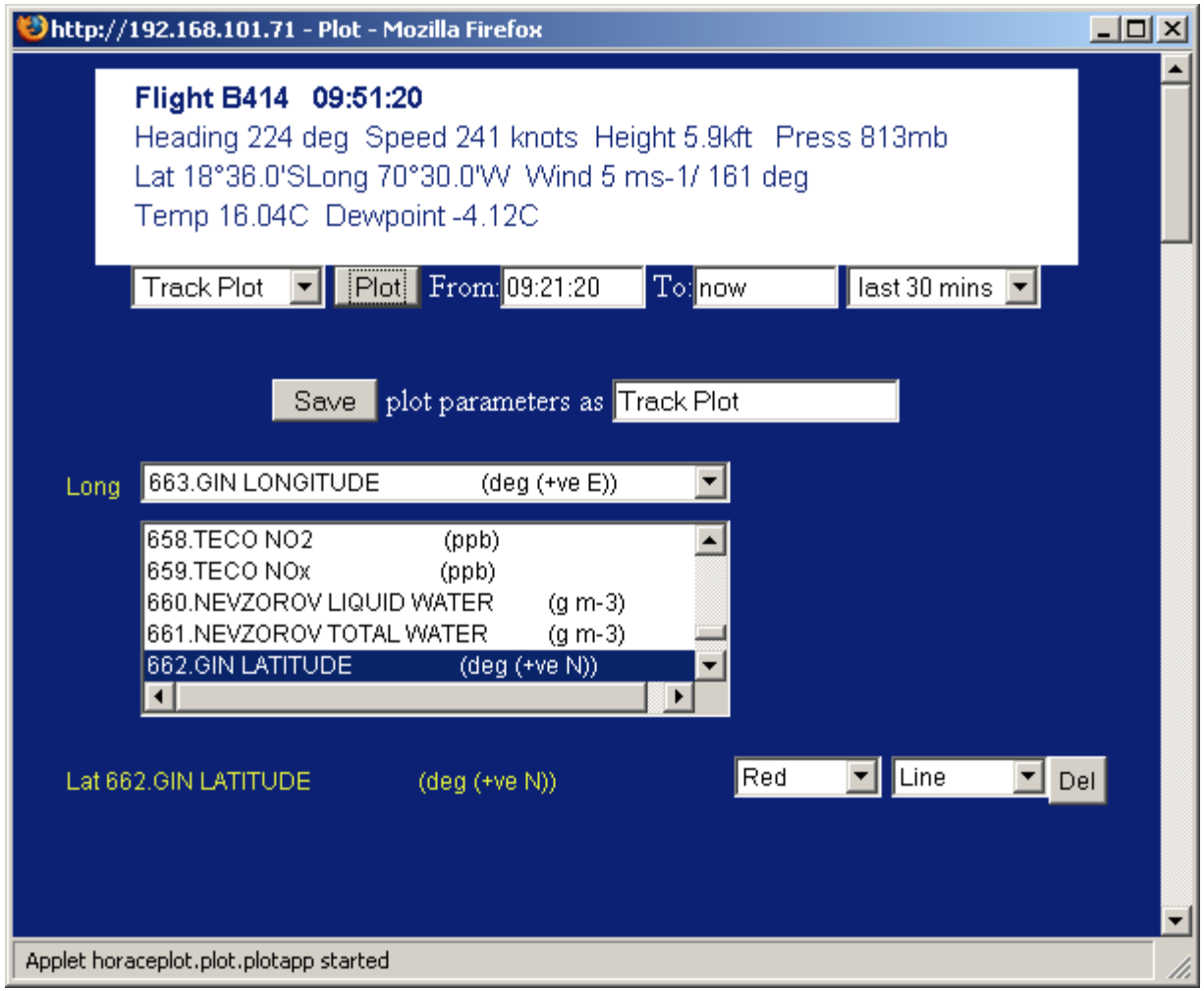
SWS - seems -

MBASE push
BAMS ✓
SONDES 7/7

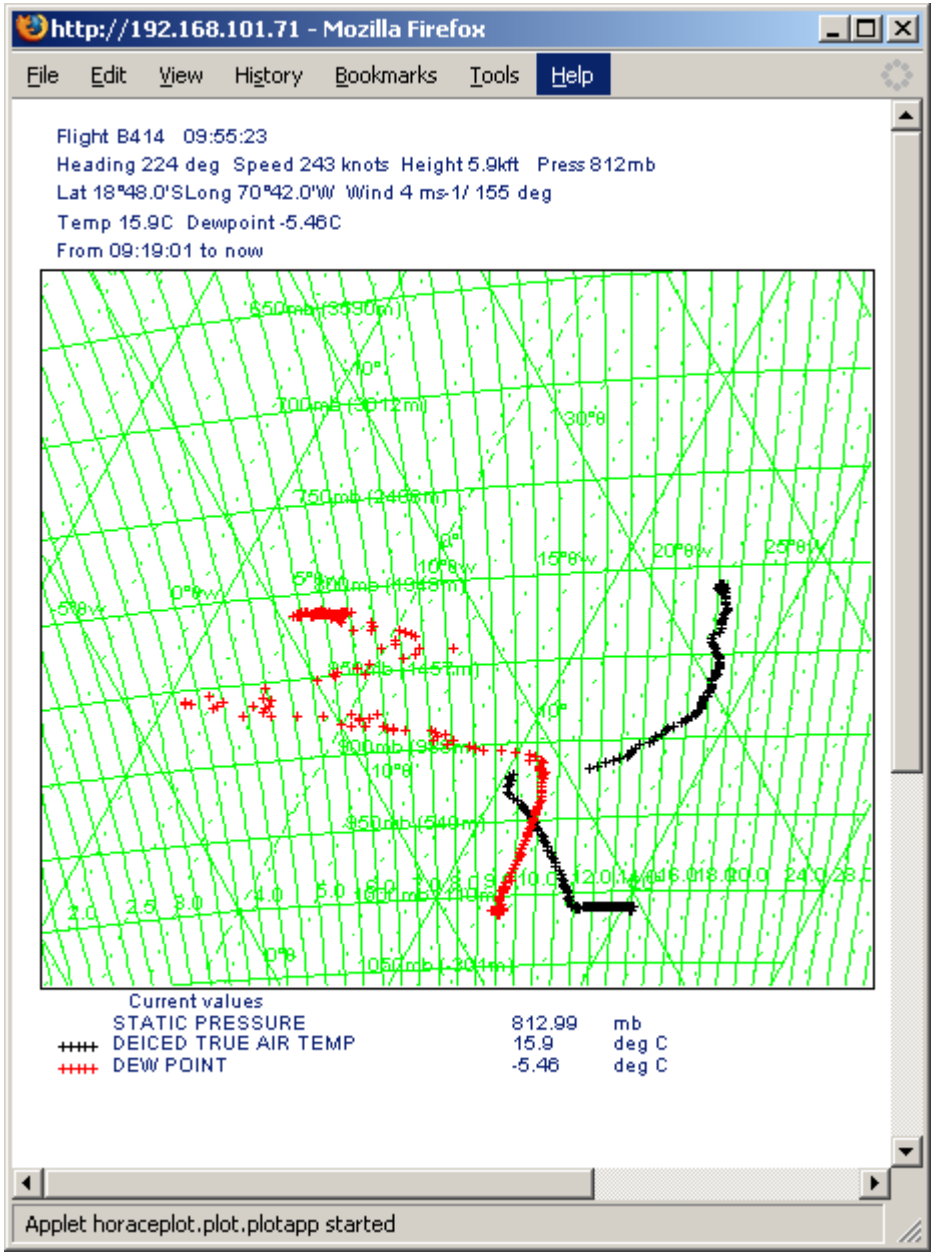
CCN - lost ↓ for 1st ½ hour
reboot when read
↳ only B column working
↳ should down during deep
— SV N° CPC FL100

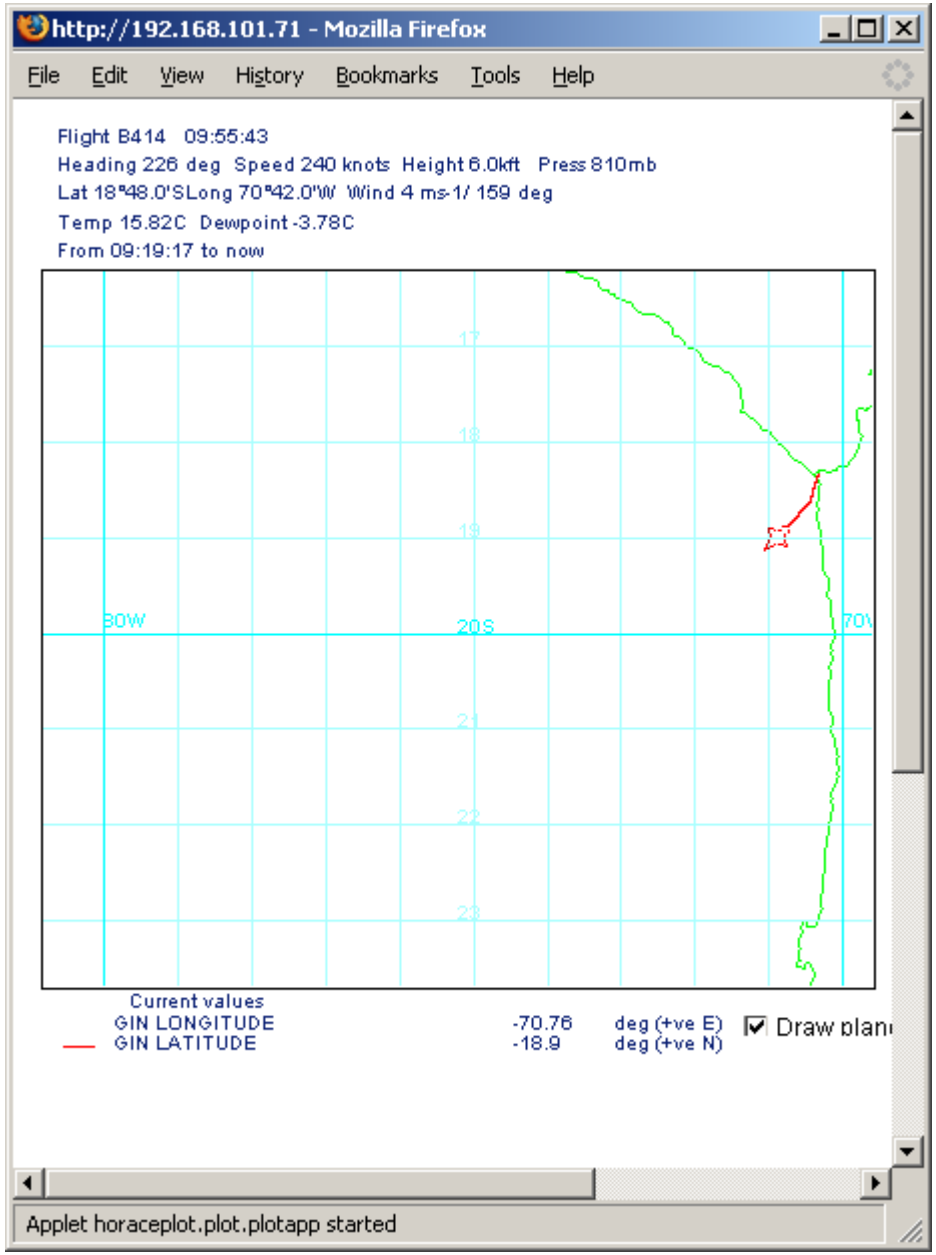
90° to power ½

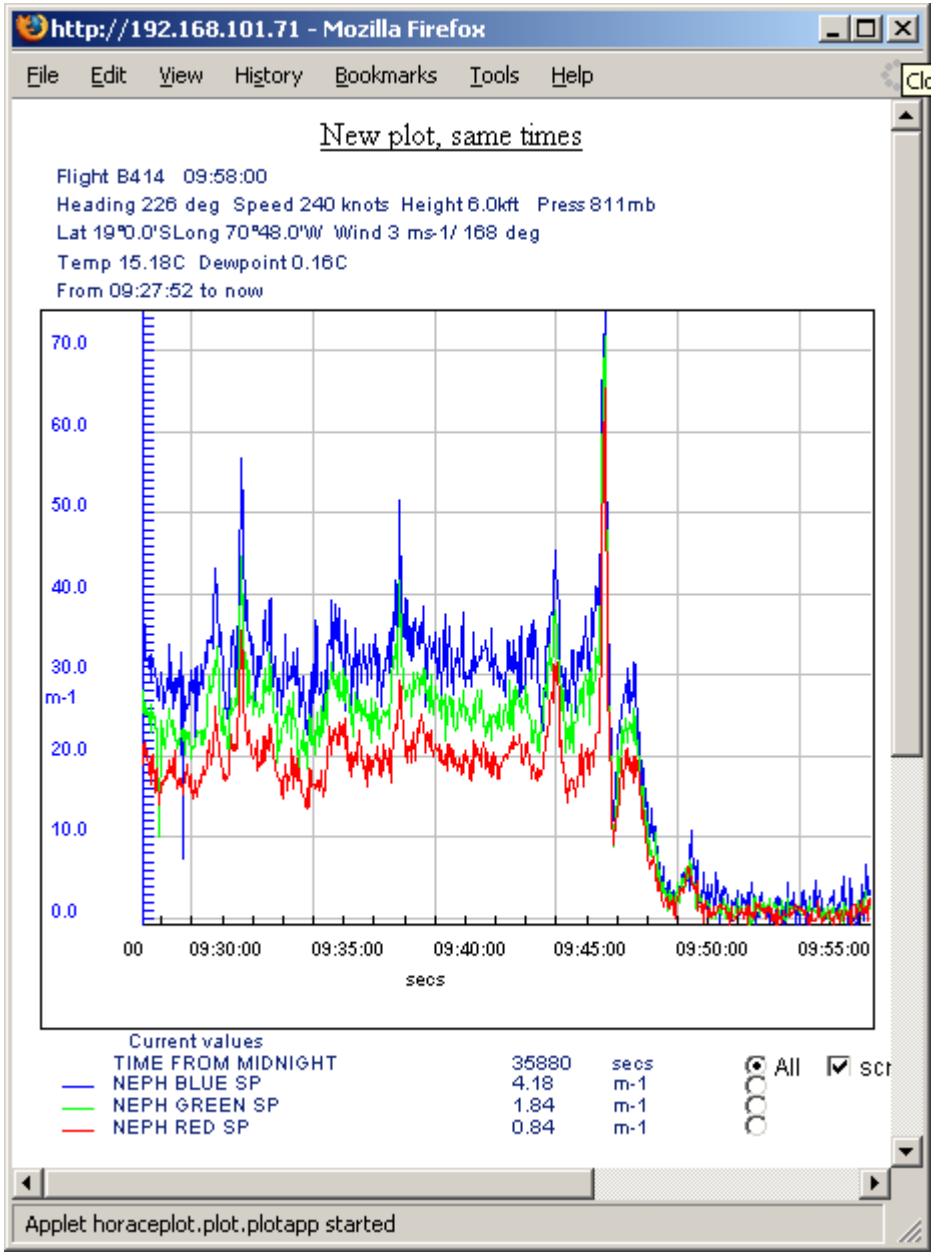
SWS ✓

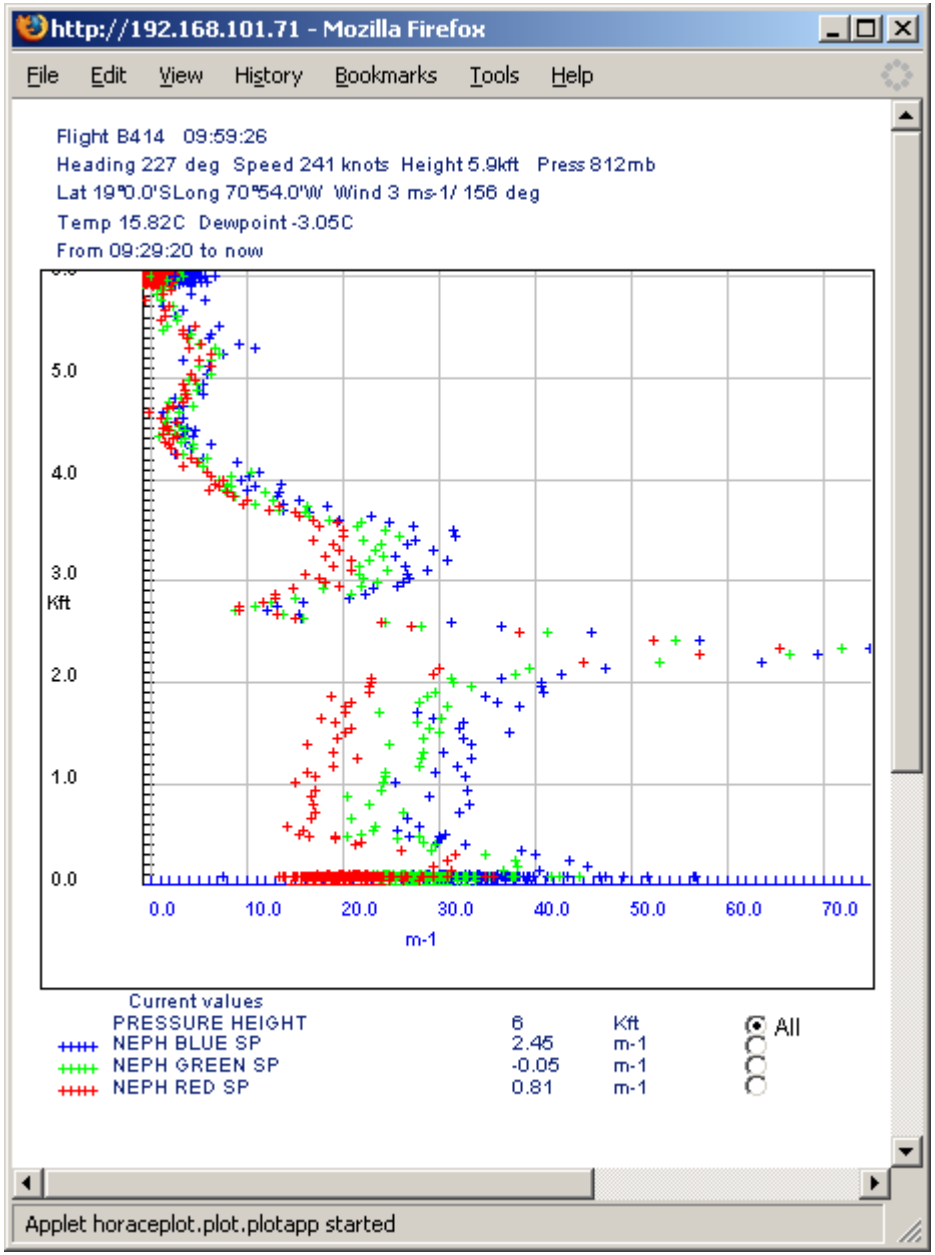


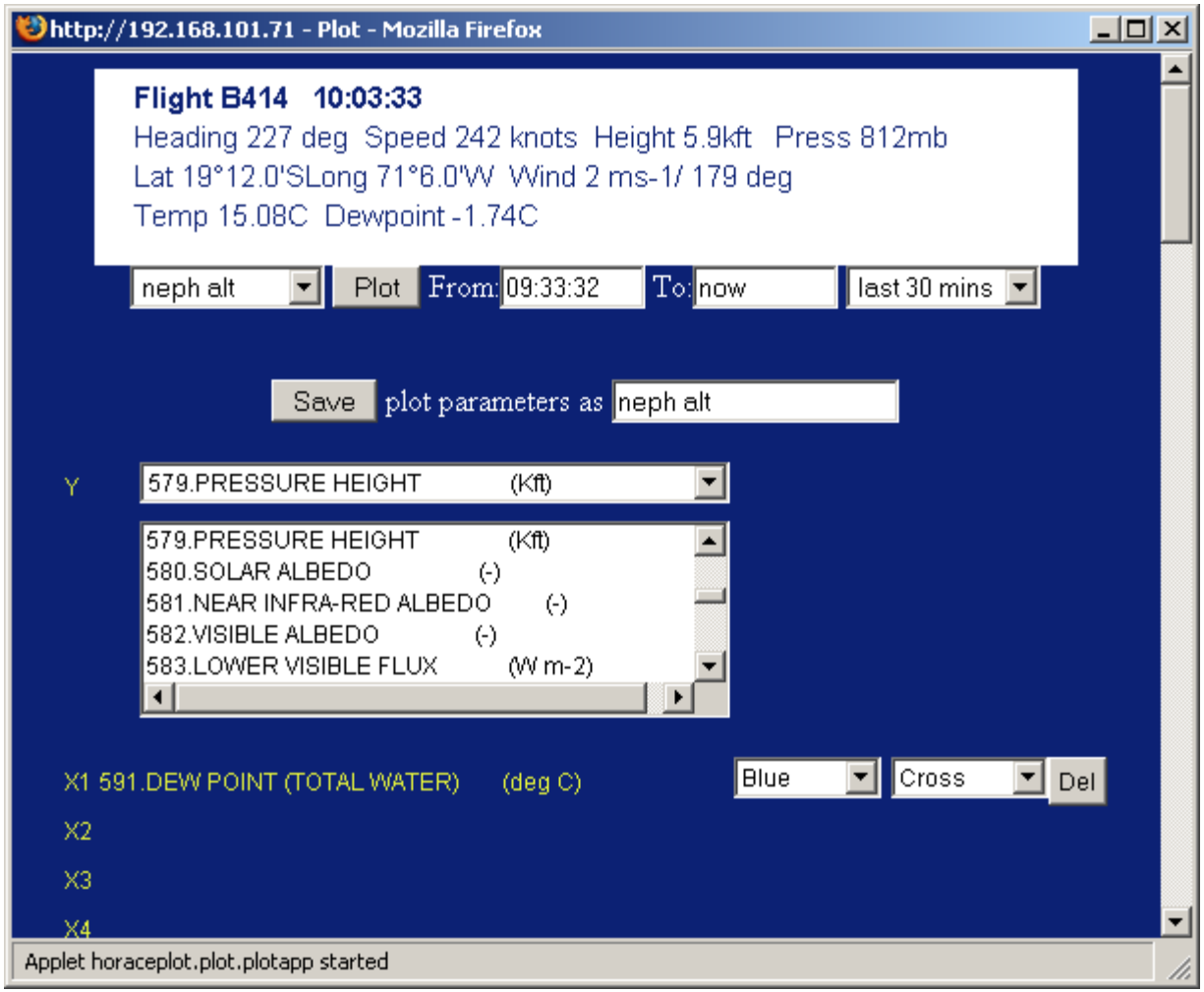
P1 end R1 start 6000ft


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 09:55:23
Heading 224 deg Speed 243 knots Height 5.9kft Press 812mb
Lat 18°48.0'S Long 70°42.0'W Wind 4 ms-1/ 155 deg
Temp 15.9C Dewpoint -5.46C
From 09:19:01 to now
Current values
STATIC PRESSURE 812.99 mb
DEICED TRUE AIR TEMP 15.9 deg C
DEW POINT -5.46 deg C
Applet horaceplot.plot.plotapp started

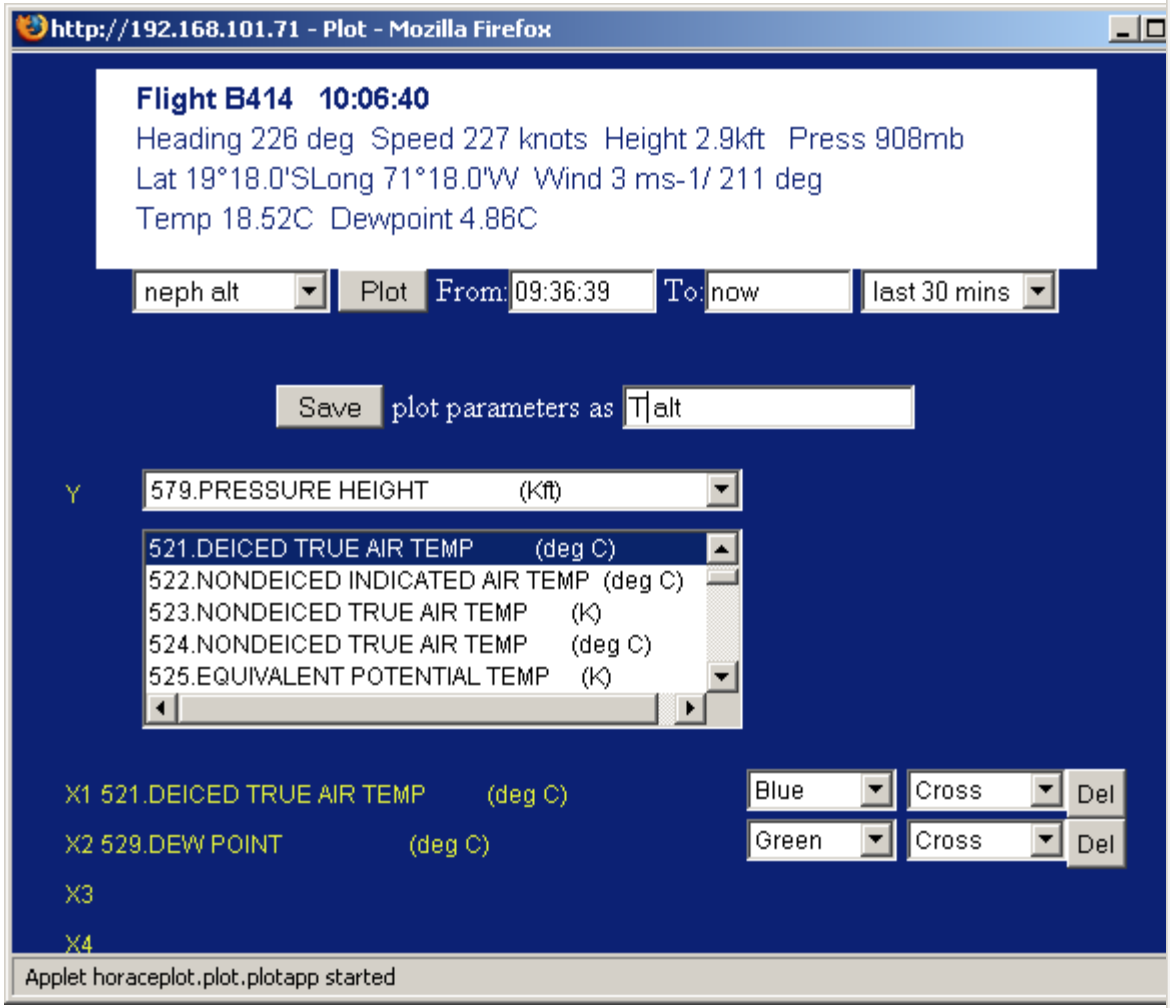

http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 09:55:43
Heading 226 deg Speed 240 knots Height 6.0kft Press 810mb
Lat 18°48.0'S Long 70°42.0'W Wind 4 ms-1/ 159 deg
Temp 15.82C Dewpoint -3.78C
From 09:19:17 to now
30W
20S
Current values
GIN LONGITUDE -70.76 deg (+ve E)
GIN LATITUDE -18.9 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
New plot, same times
Flight B414 09:58:00
Heading 226 deg Speed 240 knots Height 6.0kft Press 811mb
Lat 19°0.0'S Long 70°48.0'W Wind 3 ms-1/ 168 deg
Temp 15.18C Dewpoint 0.16C
From 09:27:52 to now
70.0
60.0
50.0
40.0
30.0
m-1
20.0
10.0
0.0
00
09:30:00
09:35:00
09:40:00
09:45:00
09:50:00
09:55:00
secs
Current values
TIME FROM MIDNIGHT 35880 secs
NEPH BLUE SP 4.18 m-1
NEPH GREEN SP 1.84 m-1
NEPH RED SP 0.84 m-1
All
Applet horaceplot.plot.plotapp started

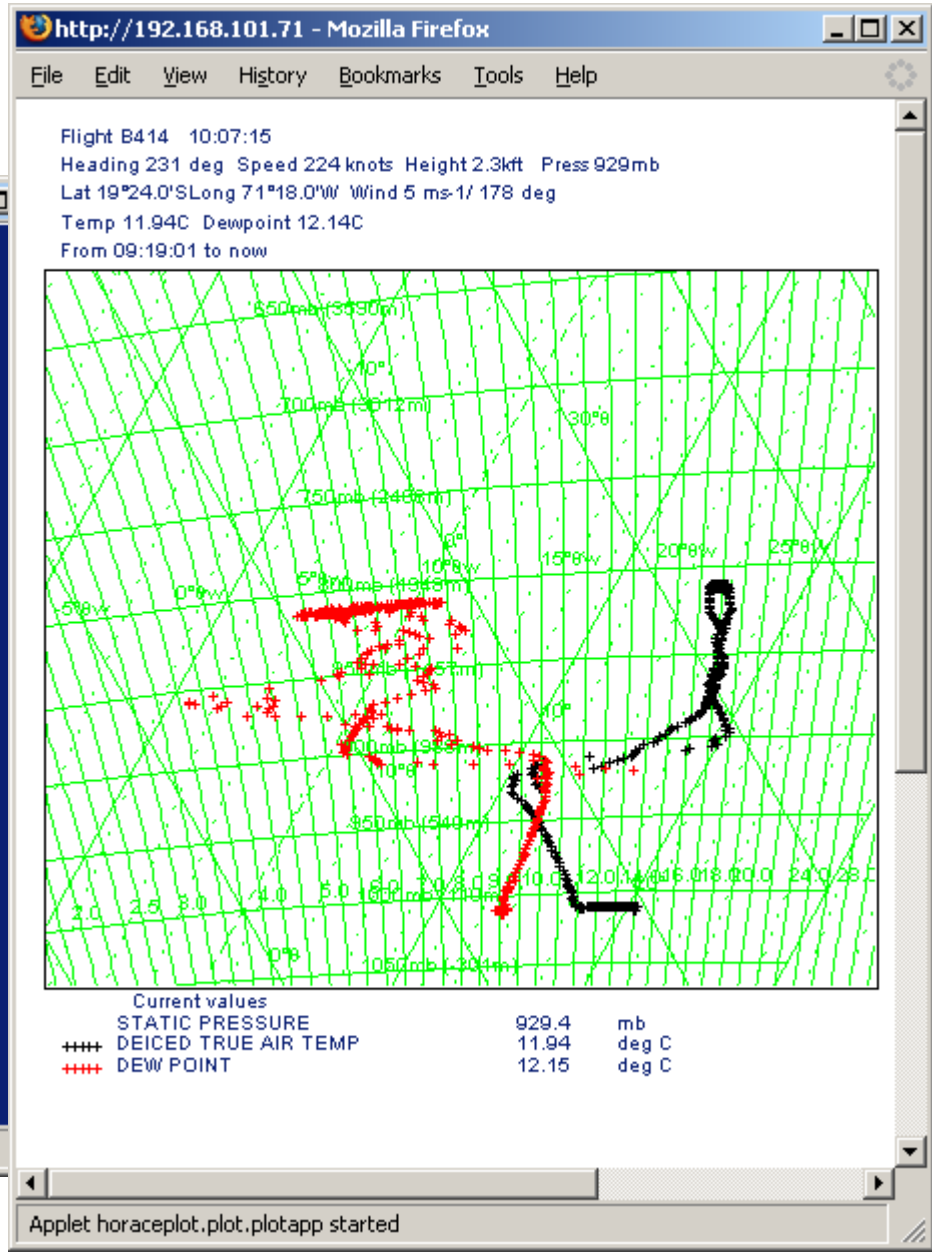

http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 09:59:26
Heading 227 deg Speed 241 knots Height 5.9kft Press 812mb
Lat 19°0.0'S Long 70°54.0'W Wind 3 ms-1/ 156 deg
Temp 15.82C Dewpoint -3.05C
From 09:29:20 to now
5.0
4.0
3.0
Kft
2.0
1.0
0.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
m-1
Current values
PRESSURE HEIGHT 6 Kft
NEPH BLUE SP 2.45 m-1
NEPH GREEN SP -0.05 m-1
NEPH RED SP 0.81 m-1
All
Applet horaceplot.plot.plotapp started



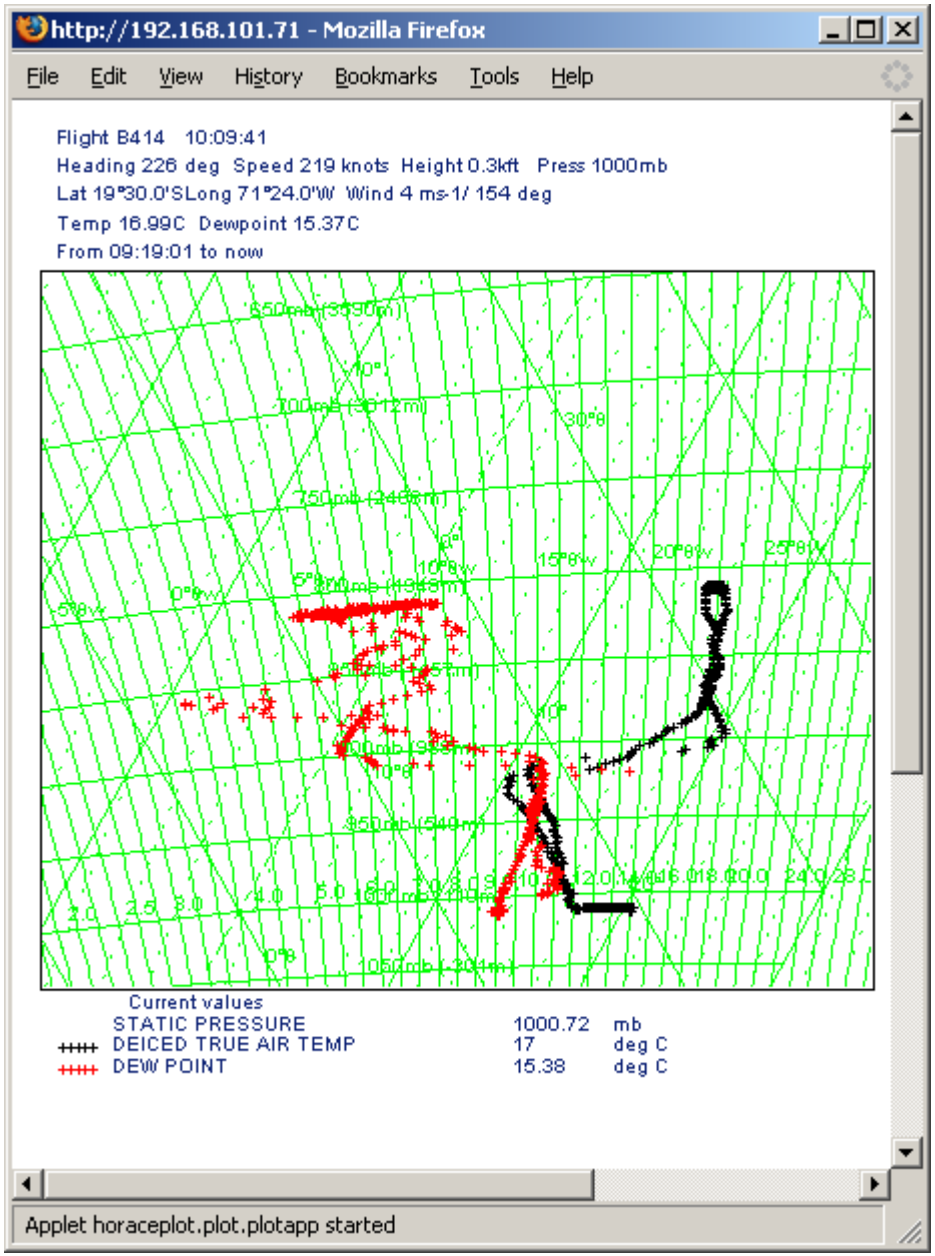
R1 end P2 start

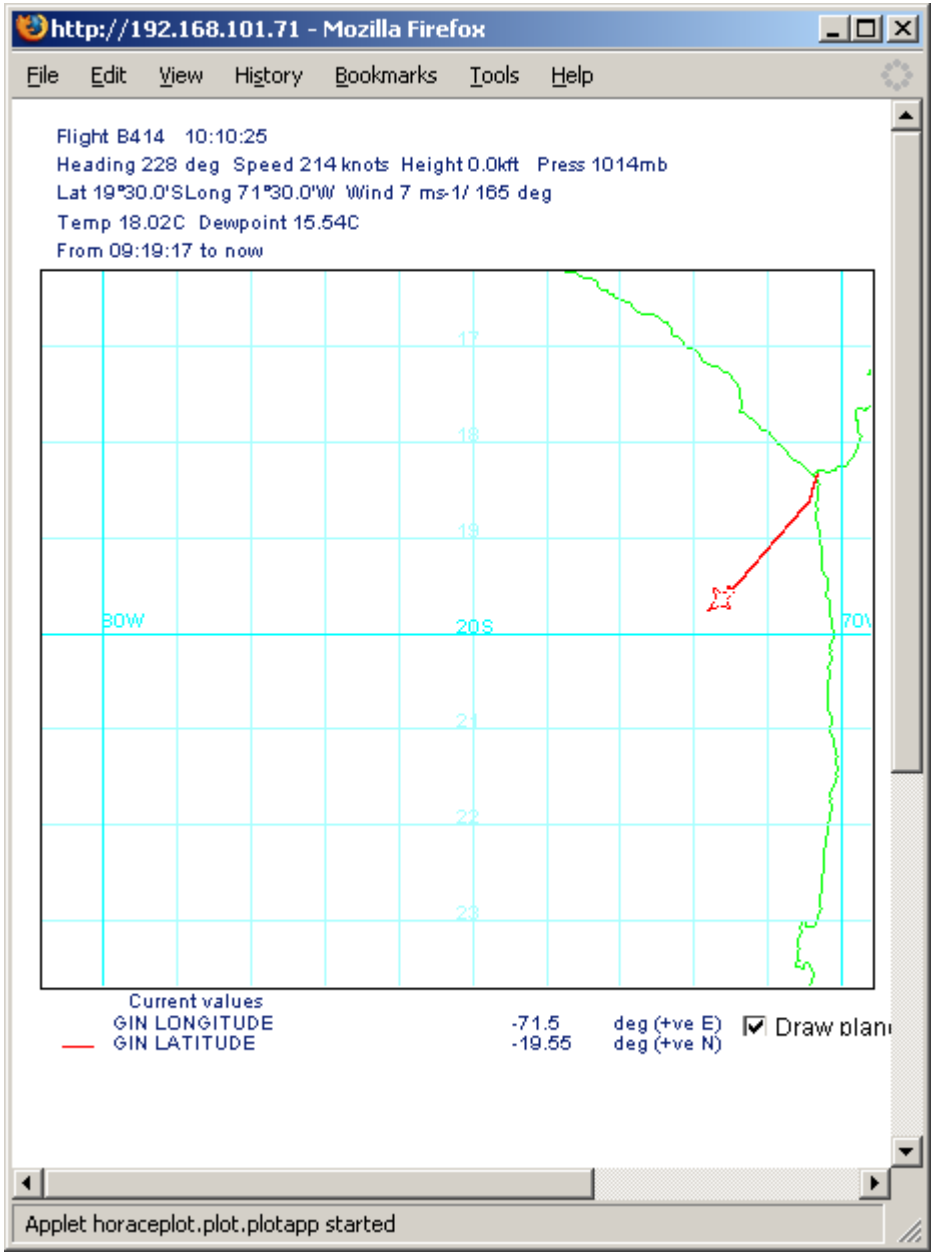


CT approx 3000ft

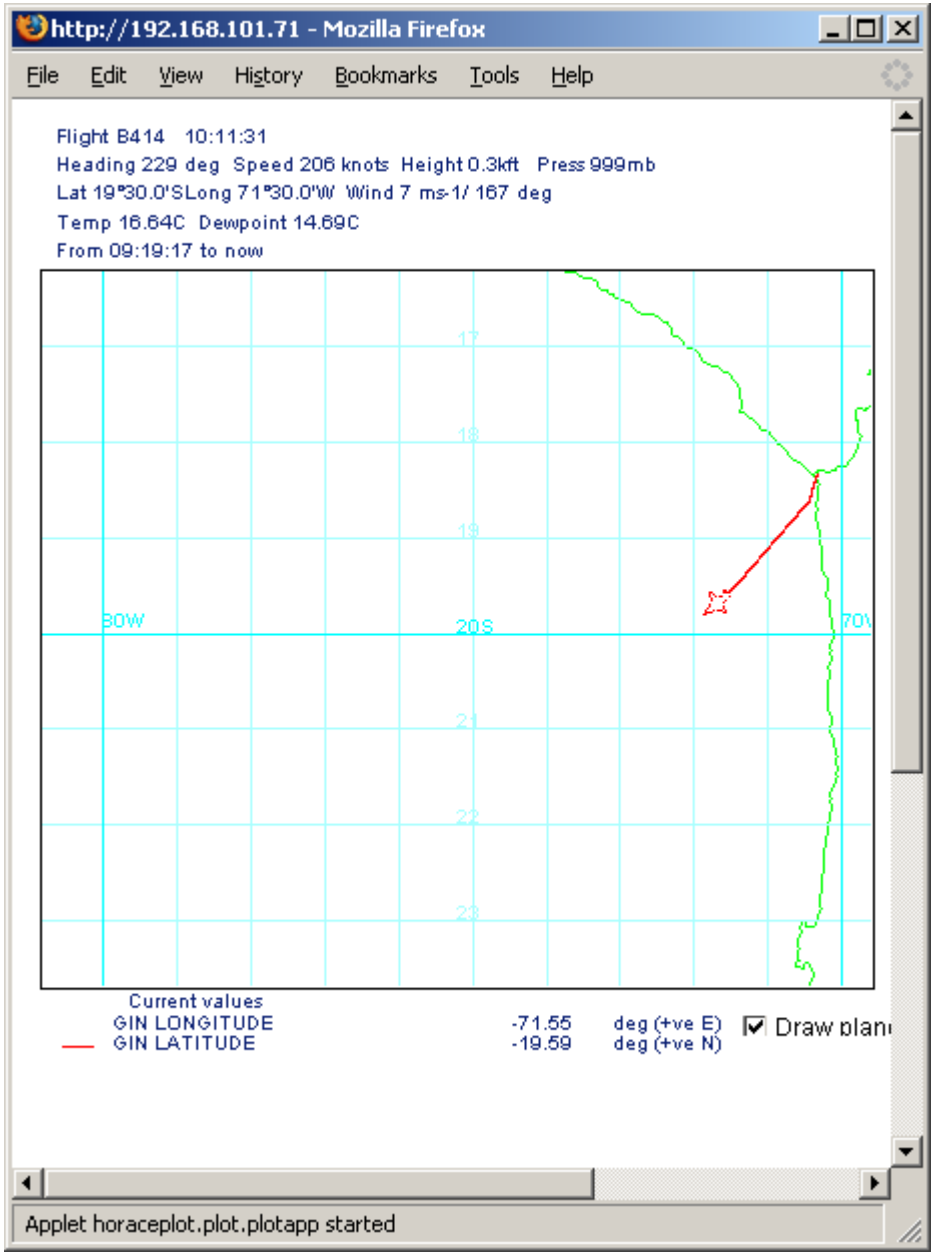


CB approx 2400ft


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 10:09:41
Heading 226 deg Speed 219 knots Height 0.3kft Press 1000mb
Lat 19°30.0'S Long 71°24.0'W Wind 4 ms-1/ 154 deg
Temp 16.99C Dewpoint 15.37C
From 09:19:01 to now
Current values
STATIC PRESSURE 1000.72 mb
DEICED TRUE AIR TEMP 17 deg C
DEW POINT 15.38 deg C
Applet horaceplot.plot.plotapp started



End P2 start P3 at 50ft



End P3 start R2.1 at 500ft

DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 10:12:40

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

Enable Enabled

Save Config

Get DAT Observed 1.06675 Dry Air Term (g/m^3)

0.00022939 Dry Air Term (W)

v2.5.1

No Fault

Hotwire_LWC Data

LWC - DAT Calc (g/m^3)
0.09

LWC - DAT Obs (g/m^3)
0.162

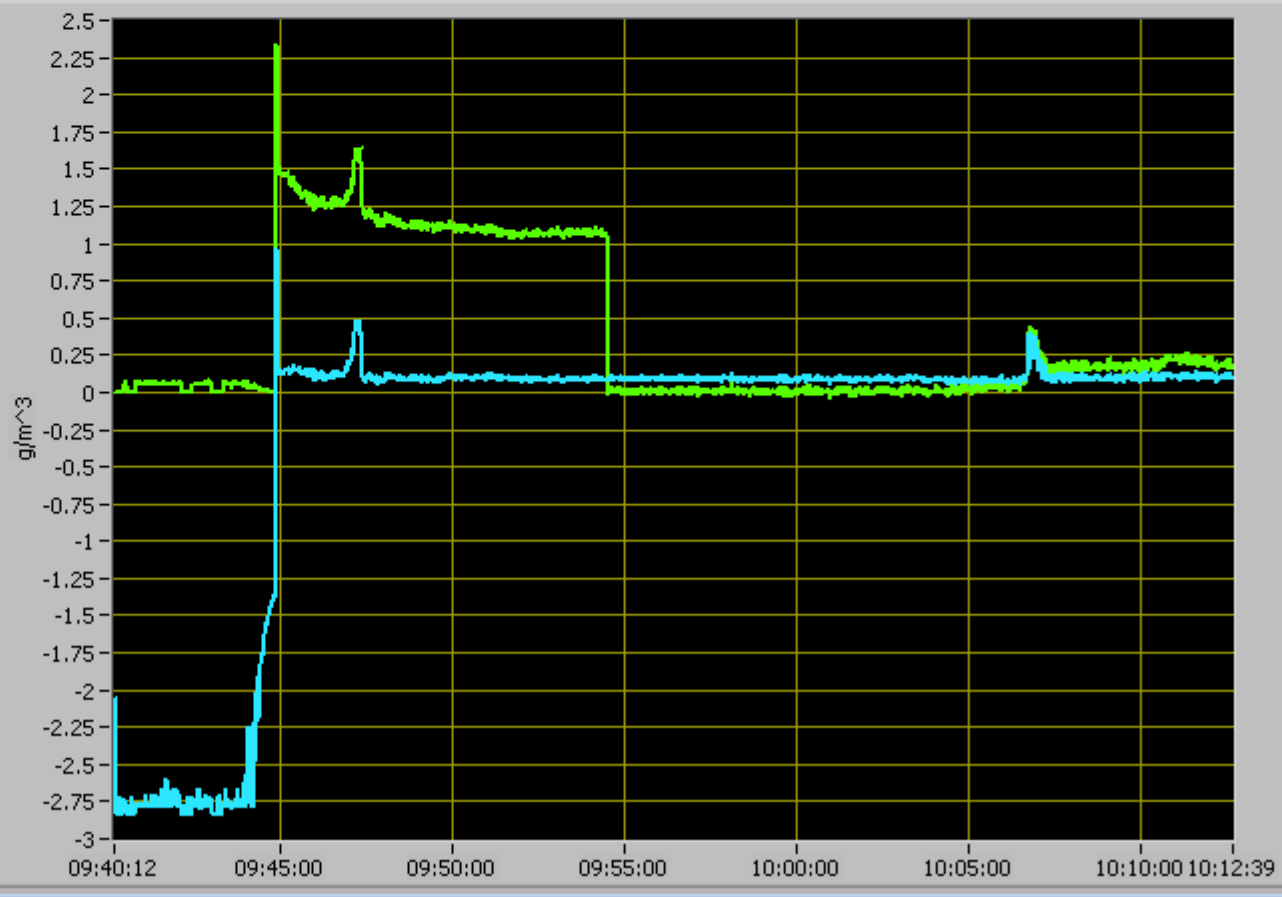
P Total (W)	
0	
DAT Calculated (W)	DAT Calculated (g/m^3)
0	1.14
DAT Observed (W)	DAT Observed (g/m^3)
0	1.07
LWC Hotwire (V)	LWC raw (g/m^3)
1.1	1.23
LWC Slave (V)	Air Density (kg/m^3)
0	1.215
Pressure (mBar)	Airspeed (m/s)
1026.15	95.4
Ambient Temp(C)	Boiling Point (K)
21	0

Hotwire LWC | Hotwire LWC w/ DAT | Selectable Charts | Dual Selectable Chart | Hotwire LWC Collective

1st Hotwire_LWC g/m^3

LWC - DAT Calc (g/m^3)

LWC - DAT Obs (g/m^3)



DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 10:12:53

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

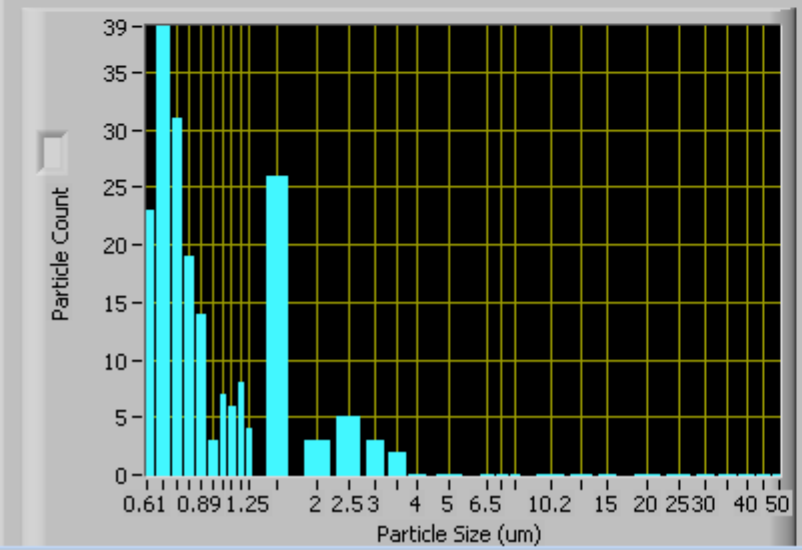
Enable Enabled

COM Port 4 No Fault v2.5.3

CAS Data | CAS Housekeeping

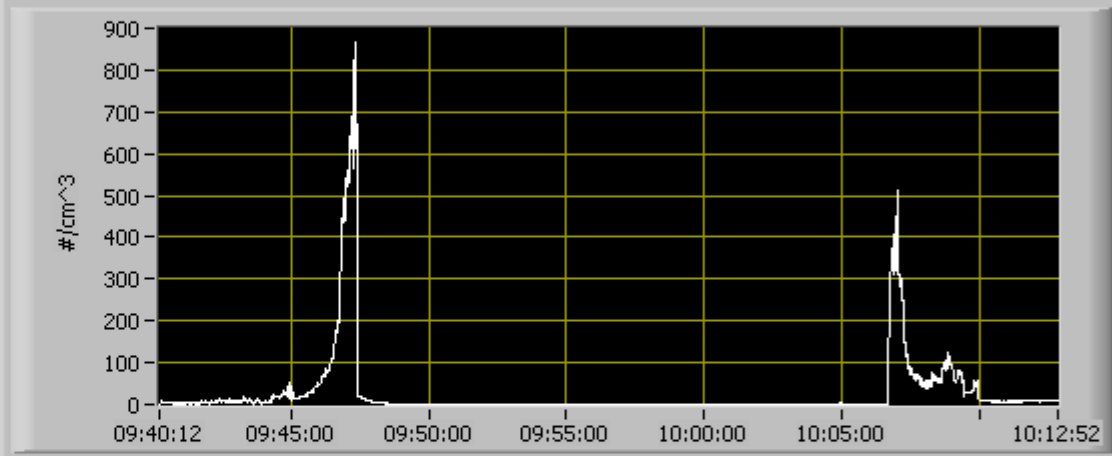
#Conc (#/cm^3) 8.22	Sum of Particles 3698	LWC Hotwire (V) 1.08
CAS LWC (g/m^3) 0	Forward Overflow 0	LWC Slave Mon (V) 0.32
CAS MVD (um) 2.11	Backward Overflow 0	Laser Curr Mon (mA) 87.5
CAS ED(um) 1.59	Ambient Temp (C) NaN	Laser Pwr Mon (V) 43.1
Dynamic Pressure 0	Static Pressure 0	Airspeed (m/s) 93.9

Forward Scattering | Backward Scattering

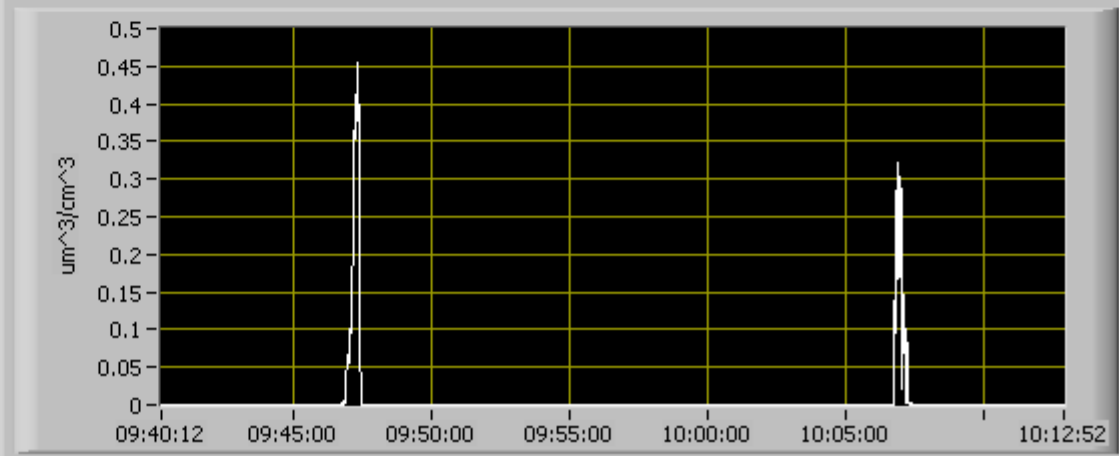


Standard Charts | Selectable Charts | Forward/Backscatter

CAS # Conc



CAS Volume Conc



DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 10:13:07

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

CIP GS Data | CIP GS Housekeeping | CIP GS Cal

Enable

Enabled

COM Port 3

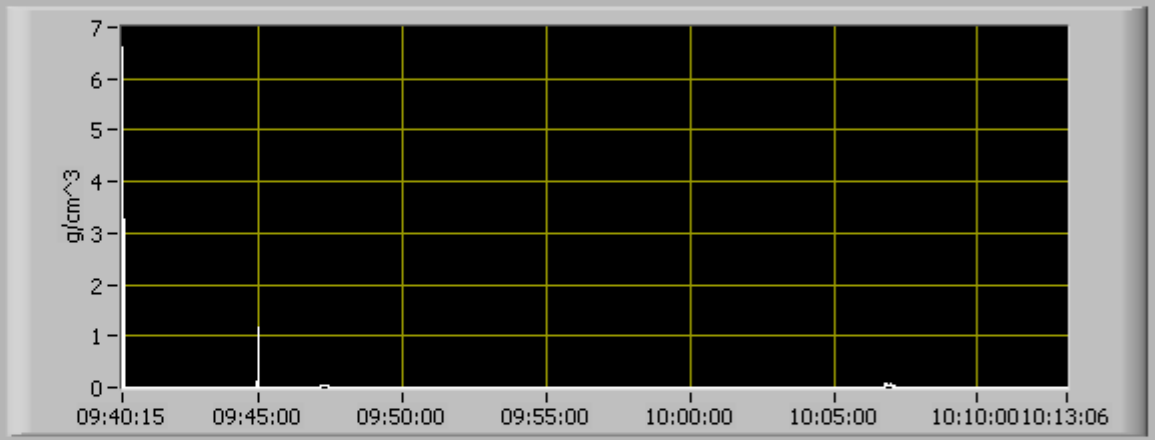
No Fault

v2.6.5

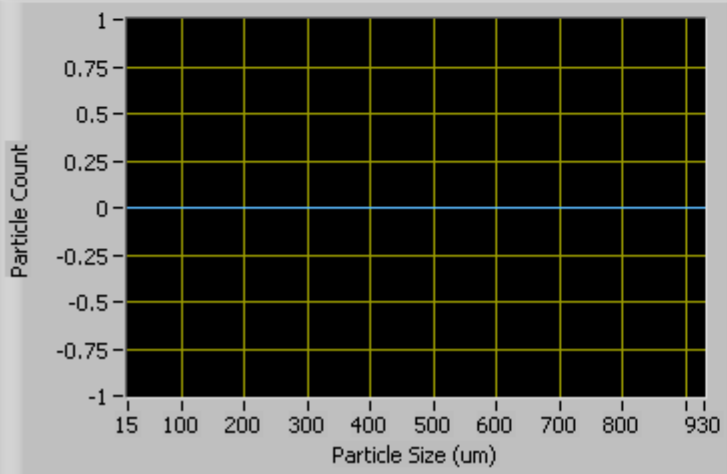
Numb Conc (cts/cm^3) 0		Oversize Reject Count 0
LWC (g/cm^3) 0		DOF Reject Count 0
MVD (um) 0		End Reject Count 0
ED (um) 0		Particle Counter 0
Diode 1 V 2.4	Diode 32 V 2.7	Diode 64 V 2.55

CIP GS # Conc/LWC | CIP GS Realtime Images | CIP GS Selectable Charts | Full Hist. | Diode Voltages

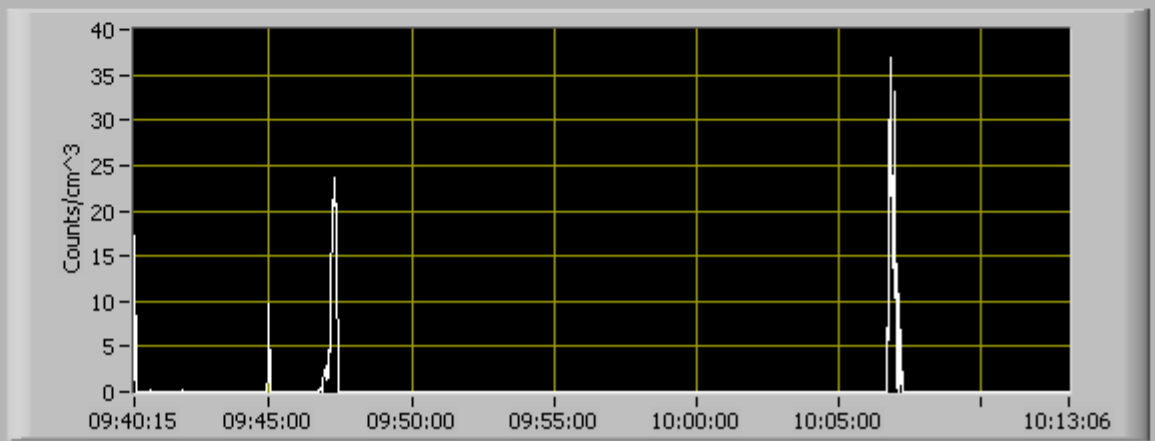
CIP GS LWC



CIP Grayscale Particle Counter



CIP GS # Conc

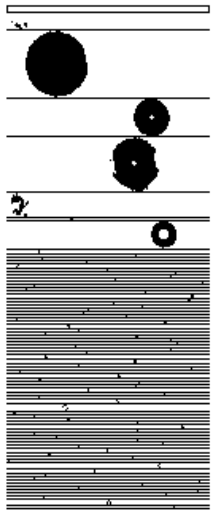


SPEC 2DS data collection and processing program - Ver 1.0.0 <Recording: base081104094050.2DS>

File Tools Window Help

2D-128 Mode

Main Display



H > V lblHVDiff V > H

Stereo Pairs 0 Settings

Bytes Received:	Particles	Blocks	Mask	HK
17506656	536004	4272	1	2045

V-time

Set True Air Speed

100

Send New True Air Speed

Send Command Packet

	Heater Zone	Heater Threshold
Vert. Transmit Arm Temp.	☑	5
Vert. Receive Arm Temp.	☑	5
Vert. Laser Temp.	☑	20

Laser Drive V 3200

Build V Mask ☑

V AM

Vertical
MaxSlice 1000
Rej. % 1
MinSlice 10

Spares (hex)

SPARE0	FFFF
SPARE	FFFF
SPARE0	FFFF
SPARE	0200
SPARE0	0078
SPARE	0
SPARE0	0
SPARE	0

Click To Send Command Packet

Housekeeping Display Processed Data

Misc

Vertical particles detected	0.0
Can internal pressure	13.50
Vertical masked bits	0
TAS	100
TAS(FIXED)	
Timing Word	
V	

Temperatures

Vert. Transmit Arm Temp.	20.5
Vert. Receive Arm Temp.	19.8
Rear Optics Bridge Temp.	27.4
DSP Board Temp.	30.2
Forward Vessel Temp.	26.0
Vert. Laser Temp.	30.1
Front Plate Temp.	21.9
Power Supply Temp.	32.2

Supply Voltage

+5V	5.01
-5V	-4.99

Raw power

+7V	6.95
-7V	-6.98

Laser Drive V 3200

Element Voltages

	Vertical
0	2.9224
21	3.2935
42	3.2031
64	2.6514
85	1.9971
106	2.1460
127	2.9395

Compression

# Blocks	1
Vertical automask iterations	0
# V overload periods	0
Compresson configuration	Both
Spare 2	22
Spare 3	51582
Spare 4	13501

SBC Temp1 Temp2 Pressure

Set Probe Mask

Vertical

Current Mask 1 - FFFF

New Mask Modify

Set New Mask

FFFF Enter new hex value for probe word # 0

Save Exit

Force All 1's

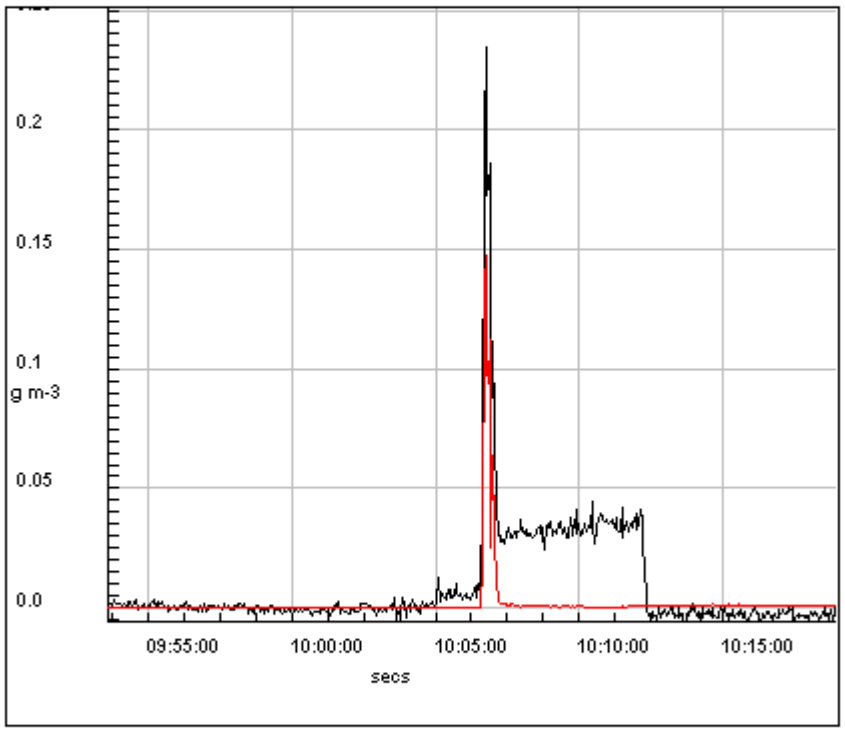
RECORDING REALTIME base081104094050.2DS

http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

New plot, same times

Flight B414 10:19:07
Heading 225 deg Speed 217 knots Height 0.3kft Press 998mb
Lat 19°54.0'S Long 71°54.0'W Wind 5 ms-1/ 154 deg
Temp 16.34C Dewpoint 13.59C
From 09:48:50 to now

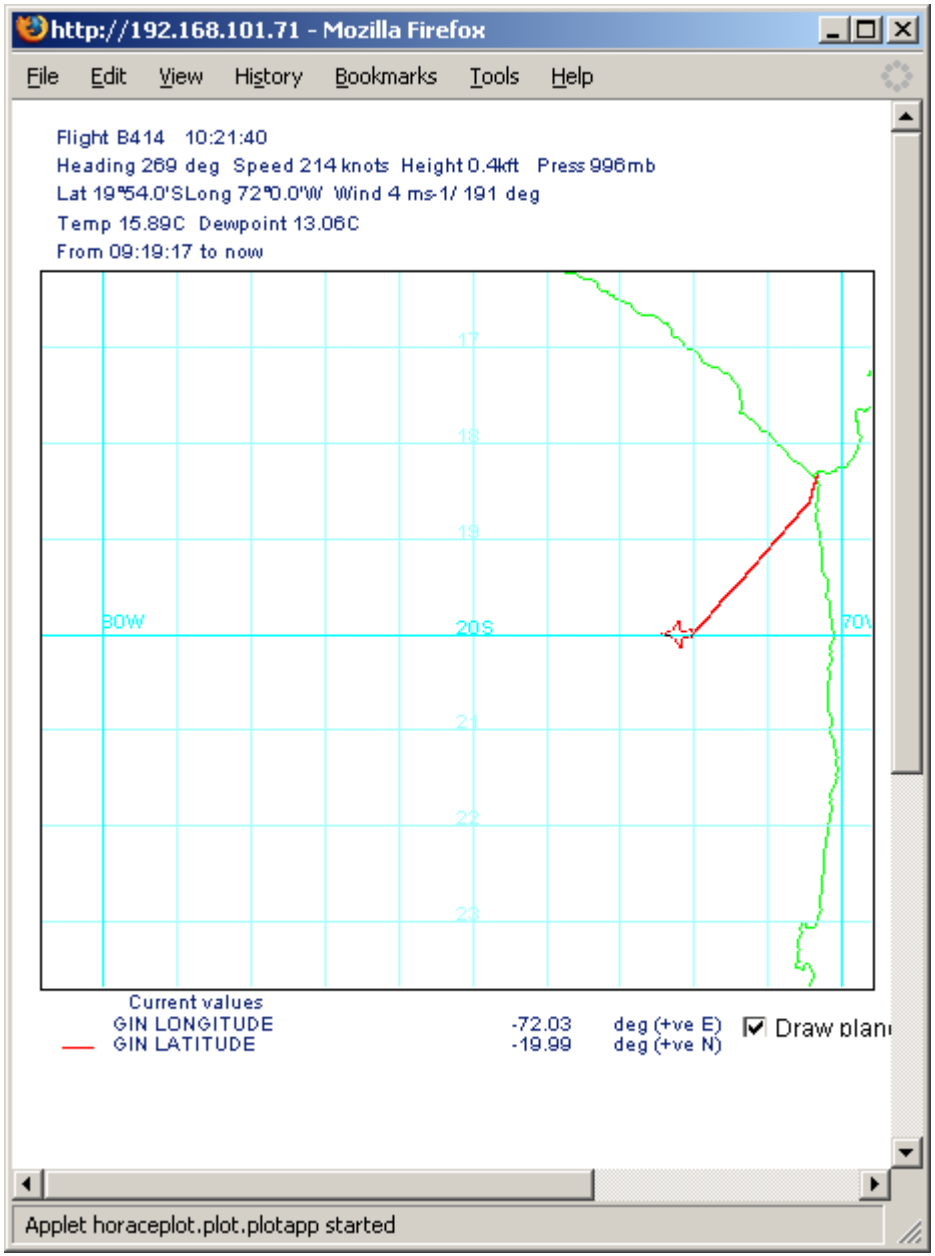


Current values

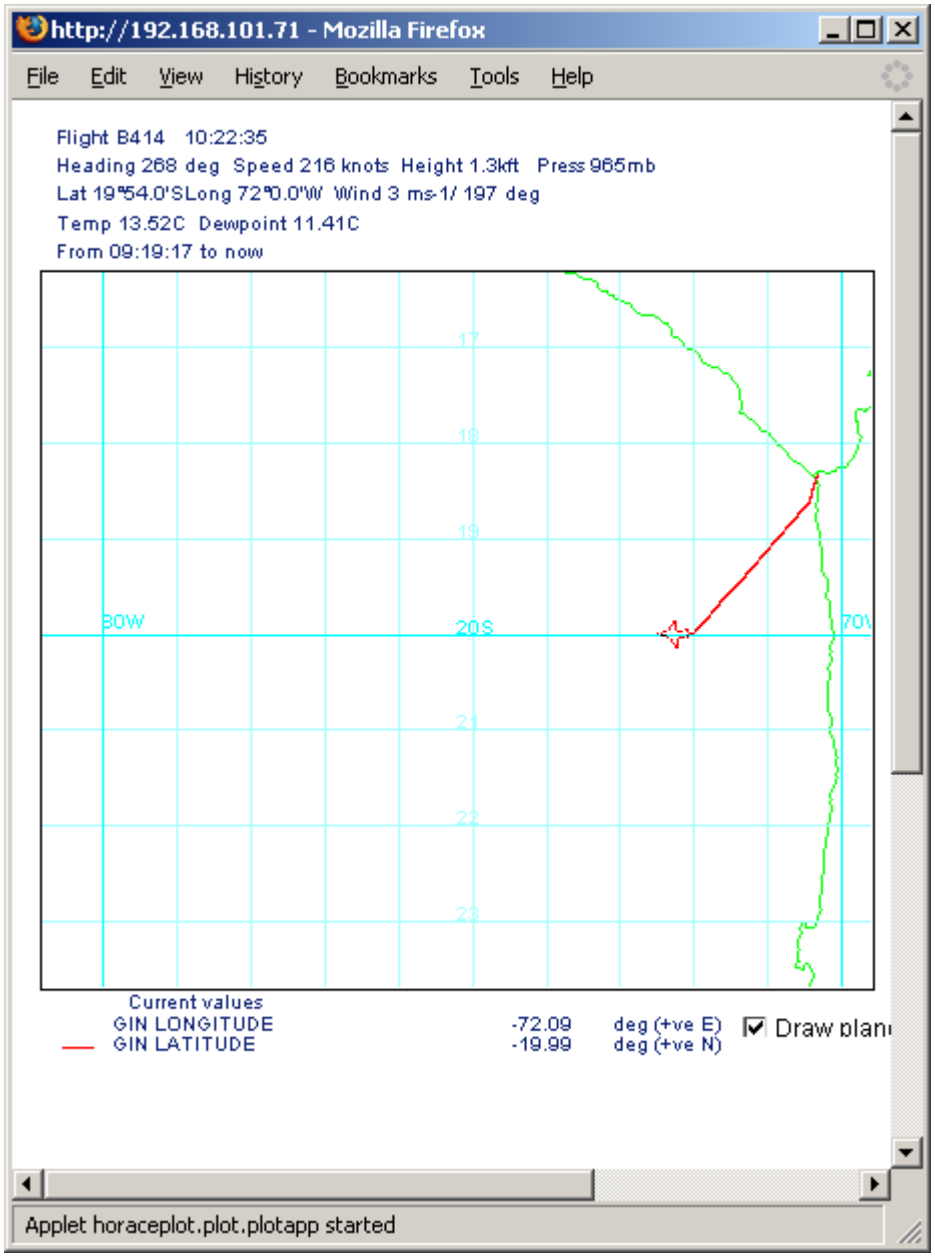
TIME FROM MIDNIGHT	37146	secs	
JW LIQUID WATER CONTENT	-0	g m-3	
NEVZOROV LIQUID WATER	0	g m-3	

All scr

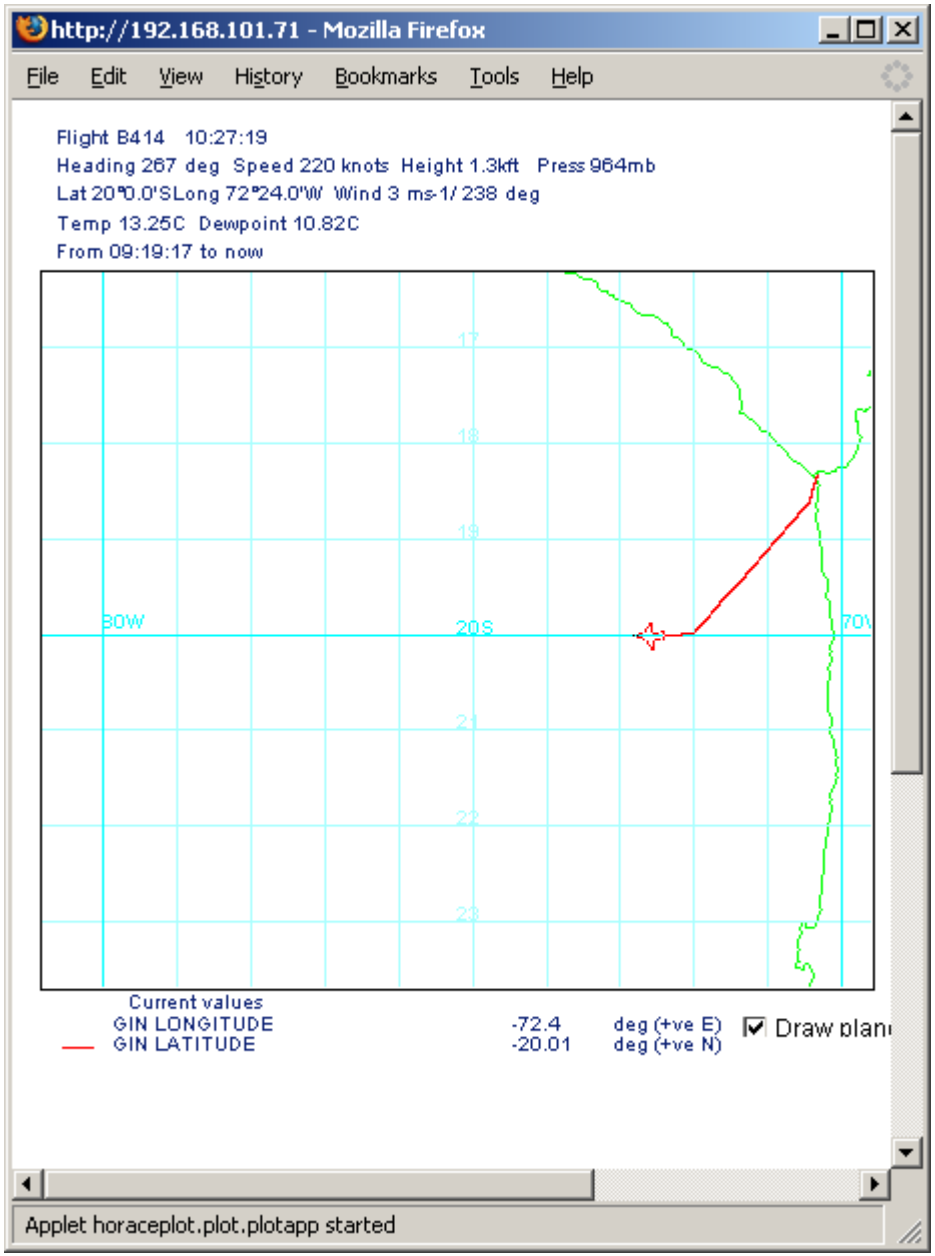
Applet horaceplot.plot.plotapp started



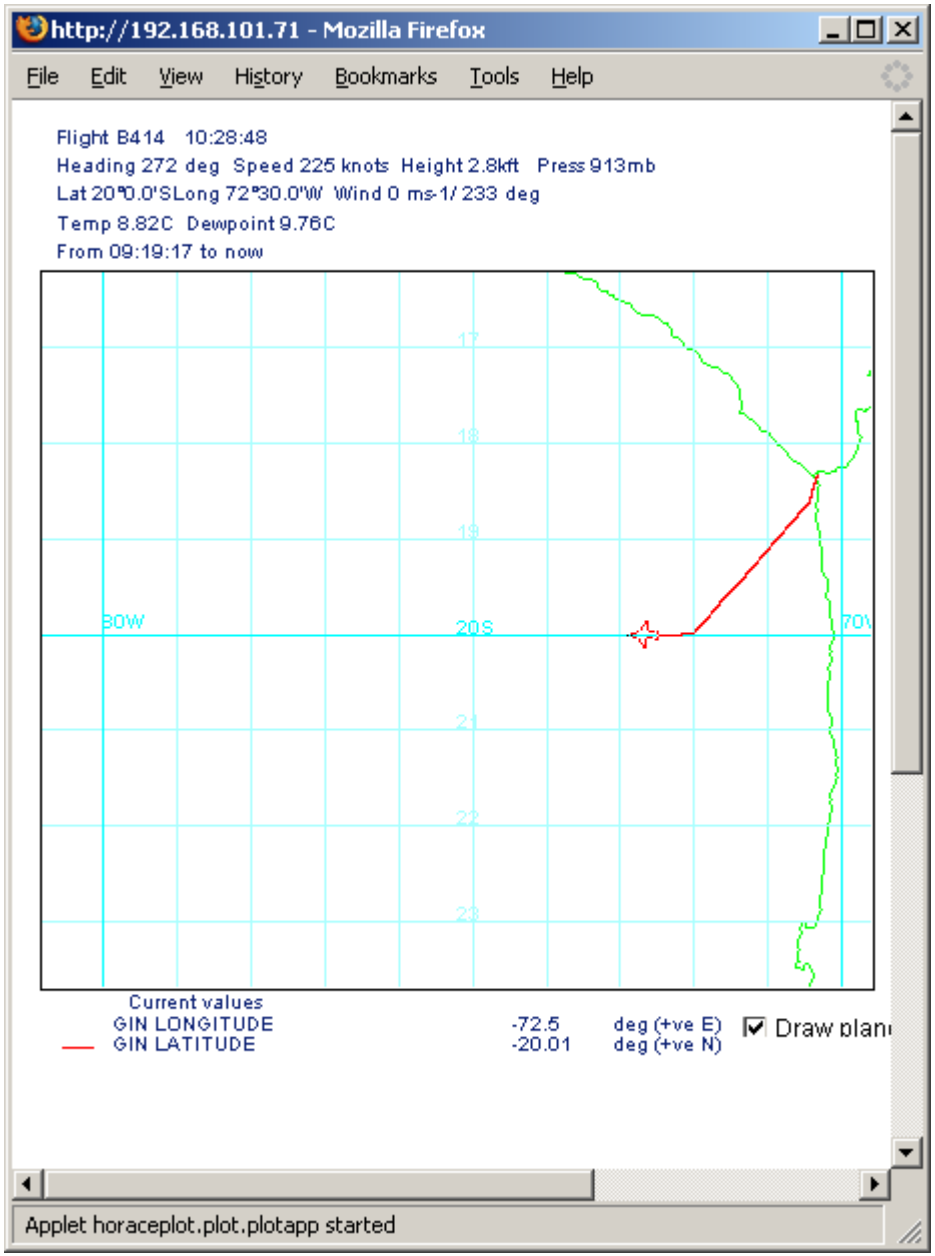
Turned at alpha end R2.1 startP4



End P4 start R2.2 at 1500ft



End R2.2 start P5



End P5 start R2.3

DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range: All

00 d 10:30:25

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

Enable: Enabled

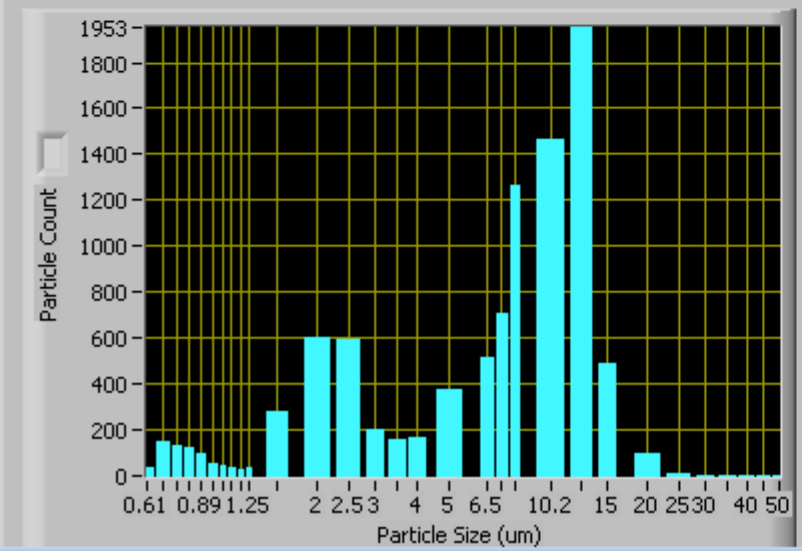
COM Port: 4 No Fault

v2.5.3

CAS Data | CAS Housekeeping

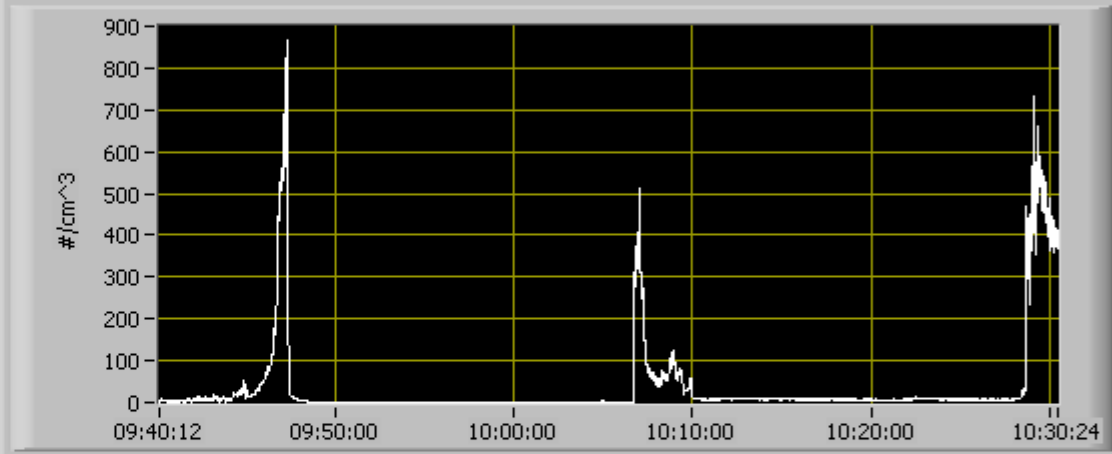
#Conc (#/cm^3): 398.25	Sum of Particles: 43955	LWC Hotwire (V): 1.25
CAS LWC (g/m^3): 0.15	Forward Overflow: 0	LWC Slave Mon (V): 0.32
CAS MVD (um): 11.32	Backward Overflow: 0	Laser Curr Mon (mA): 87.5
CAS ED(um): 10.63	Ambient Temp (C): NaN	Laser Pwr Mon (V): 43
Dynamic Pressure: 0	Static Pressure: 0	Airspeed (m/s): 96.4

Forward Scattering | Backward Scattering

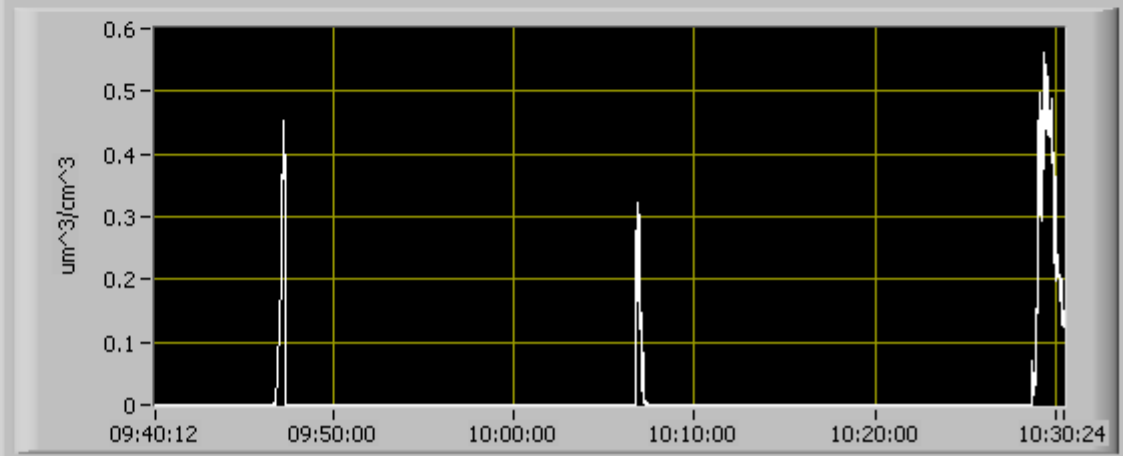


Standard Charts | Selectable Charts | Forward/Backscatter

CAS # Conc



CAS Volume Conc



DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 10:30:52

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

Enable Enabled

Save Config

Get DAT Observed 1.06675 Dry Air Term (g/m^3)

0.00022939 Dry Air Term (W)

v2.5.1

No Fault

Hotwire_LWC Data

LWC - DAT Calc (g/m^3)
0.198

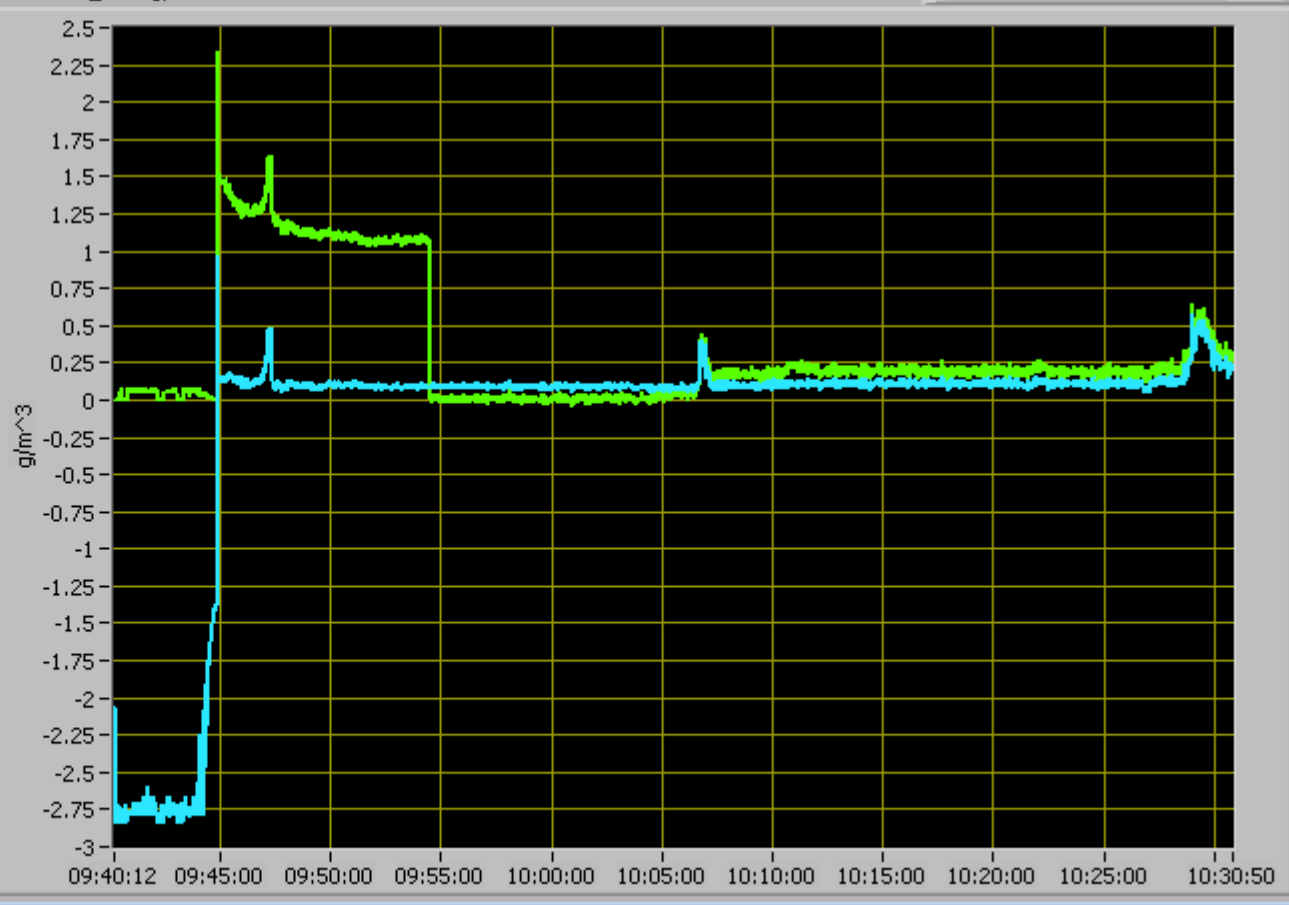
LWC - DAT Obs (g/m^3)
0.271

P Total (W)	
0	
DAT Calculated (W)	DAT Calculated (g/m^3)
0	1.14
DAT Observed (W)	DAT Observed (g/m^3)
0	1.07
LWC Hotwire (V)	LWC raw (g/m^3)
1.23	1.34
LWC Slave (V)	Air Density (kg/m^3)
0	1.141
Pressure (mBar)	Airspeed (m/s)
939.19	96.7
Ambient Temp(C)	Boiling Point (K)
13.7	0

Hotwire LWC | Hotwire LWC w/ DAT | Selectable Charts | Dual Selectable Chart | Hotwire LWC Collective

1st Hotwire_LWC g/m^3

LWC - DAT Calc (g/m^3)
LWC - DAT Obs (g/m^3)



DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 10:31:07

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

CIP GS Data | CIP GS Housekeeping | CIP GS Cal

Enable

Enabled

COM Port 3

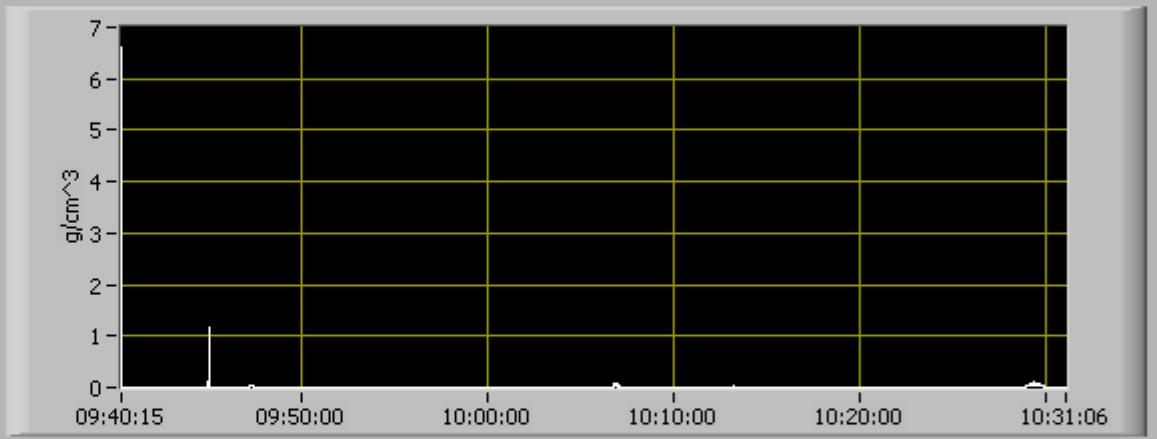
No Fault

v2.6.5

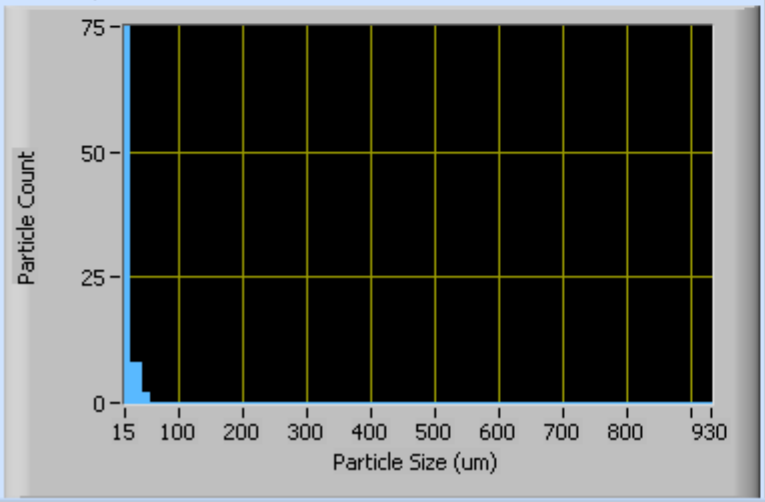
CIP GS # Conc/LWC | CIP GS Realtime Images | CIP GS Selectable Charts | Full Hist. | Diode Voltages

Numb Conc (cts/cm^3) 2.67		Oversize Reject Count 0
LWC (g/cm^3) 0.01		DOF Reject Count 0
MVD (um) 8.77		End Reject Count 0
ED (um) 23.16		Particle Counter 85
Diode 1 V 2.33	Diode 32 V 2.62	Diode 64 V 2.7

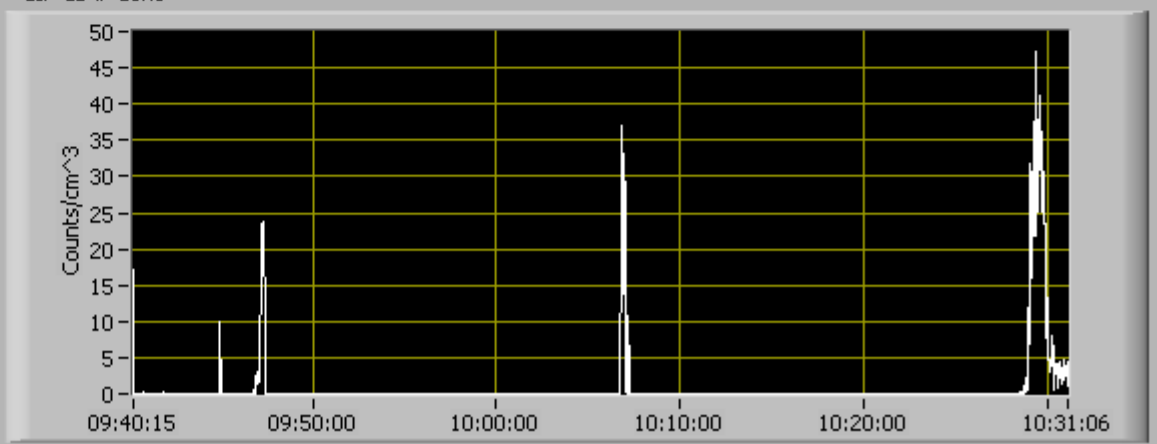
CIP GS LWC



CIP Grayscale Particle Counter



CIP GS # Conc

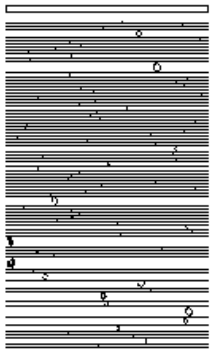


SPEC 2DS data collection and processing program - Ver 1.0.0 <Recording: base081104094050.2DS>

File Tools Window Help

2D-128 Mode

Main Display



H > V lblHVDiff V > H

Stereo Pairs 0 Settings

Bytes Received:	Particles	Blocks	Mask	HK
52810926	2459158	12887	1	3062

V-time

Set True Air Speed

100

Send New True Air Speed

Housekeeping Display Processed Data

Misc

Vertical particles detected	265.0	TAS	100
		TAS(FIXED)	
Can internal pressure	12.40	Timing Word	
Vertical masked bits	0		
		V	

Temperatures

Vert. Transmit Arm Temp.	12.1
Vert. Receive Arm Temp.	11.3
Rear Optics Bridge Temp.	24.4
DSP Board Temp.	27.7
Forward Vessel Temp.	21.4
Vert. Laser Temp.	28.5
Front Plate Temp.	14.4
Power Supply Temp.	29.8

Supply Voltage

+5V	5.01
-5V	-4.99

Raw power

+7V	6.96
-7V	-7.15

Laser Drive

V 3200

Element Voltages

	Vertical
0	2.8857
21	3.1982
42	3.1543
64	2.7124
85	1.9873
106	2.0801
127	2.9224

Compression

# Blocks	3
Vertical automask iterations	0
# V overload periods	0
Compresson configuration	Both
Spare 2	38
Spare 3	10003
Spare 4	33435

SBC Temp1 Temp2 Pressure

Send Command Packet

	Heater Zone	Heater Threshold
Vert. Transmit Arm Temp.	☑	5
Vert. Receive Arm Temp.	☑	5
Vert. Laser Temp.	☑	20

Laser Drive V 3200

Build V Mask ☑

V AM

Vertical

MaxSlice	1000
Rej. %	1
MinSlice	10

Spares (hex)

SPARE0	FFFF
SPARE	FFFF
SPARE0	FFFF
SPARE	0200
SPARE0	0078
SPARE	0
SPARE0	0
SPARE	0

Click To Send Command Packet

Set Probe Mask

Vertical

Current Mask 1 - FFFF

New Mask Modify

Set New Mask

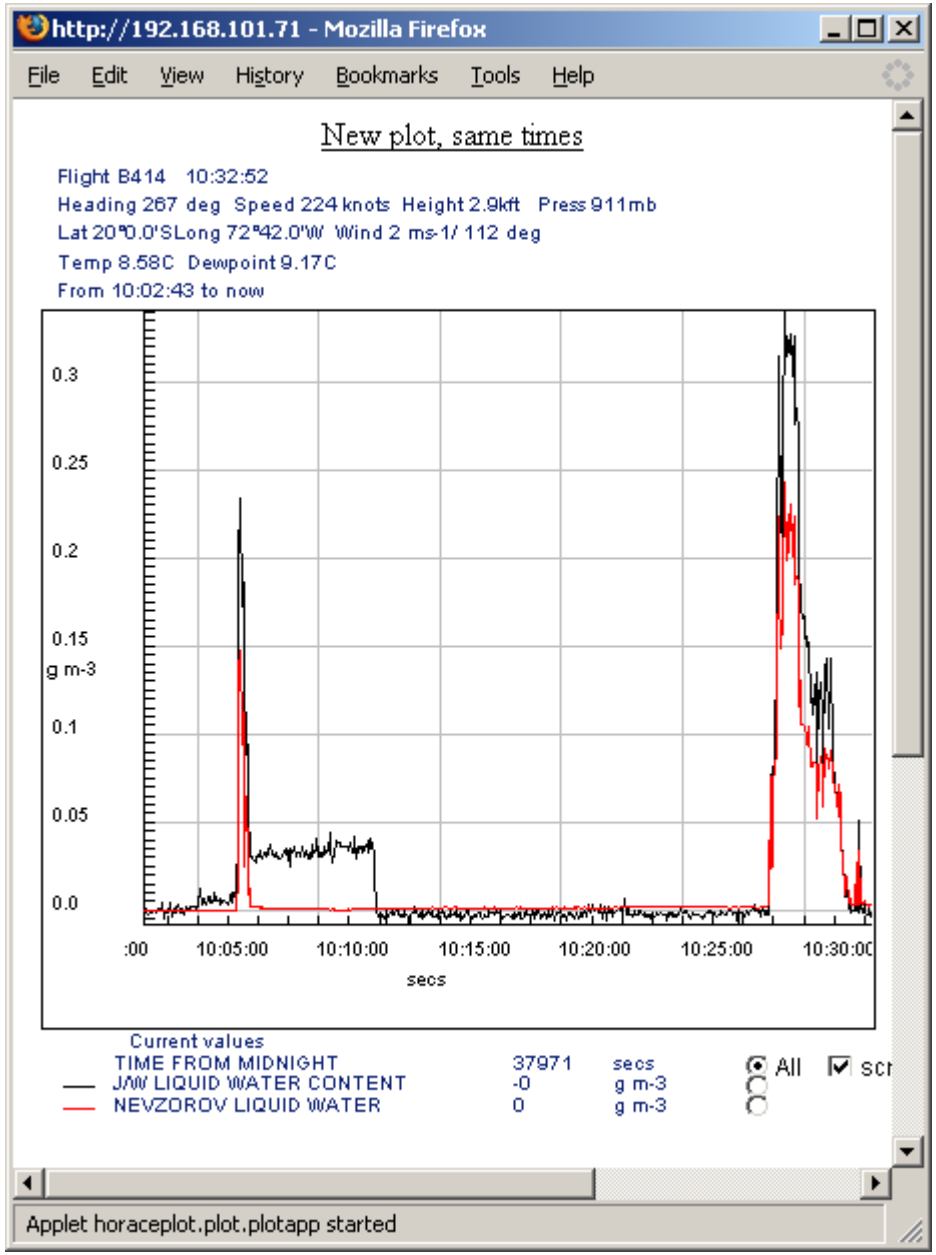
FFFF

Enter new hex value for probe word # 0

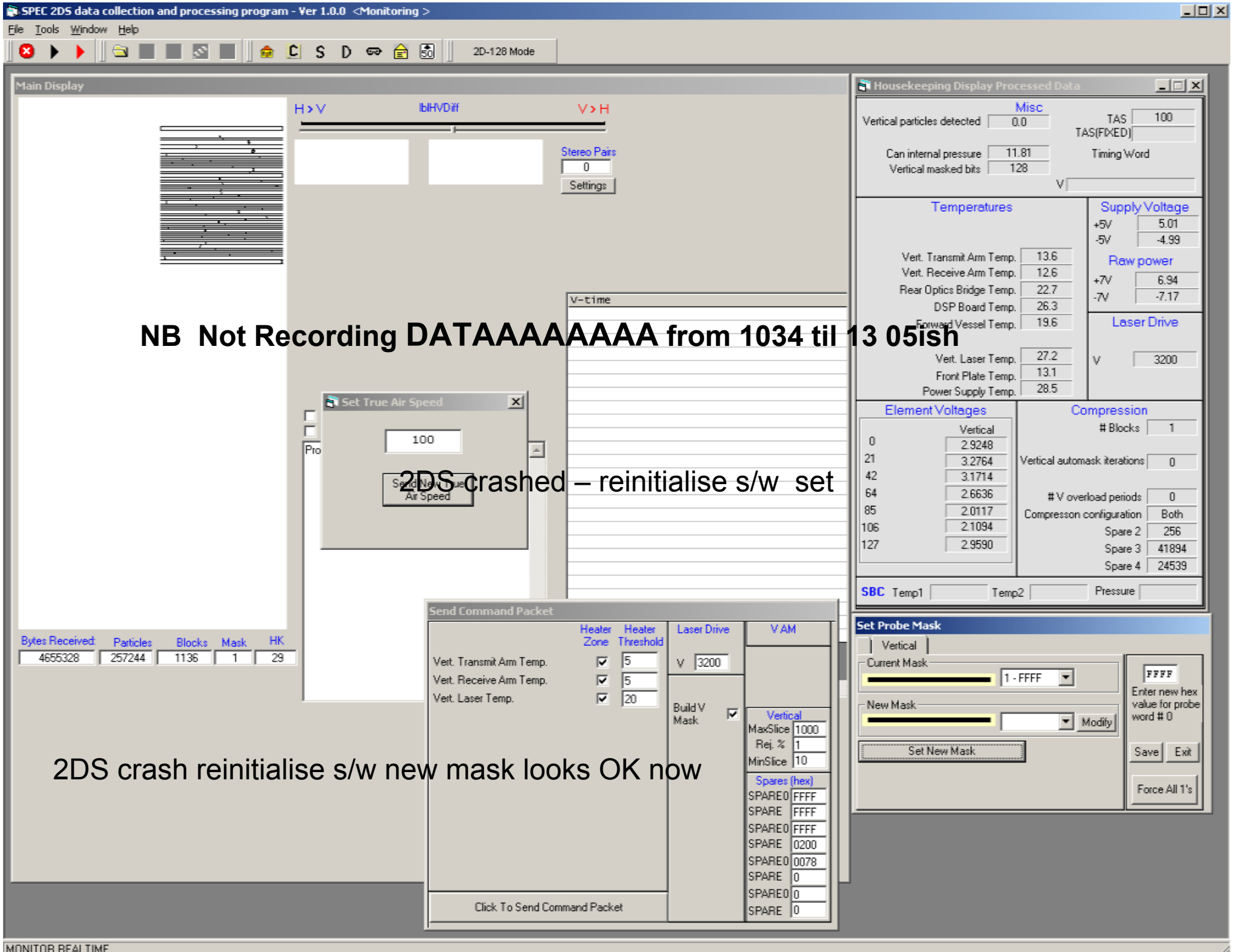
Save Exit

Force All 1's

RECORDING REALTIME base081104094050.2DS



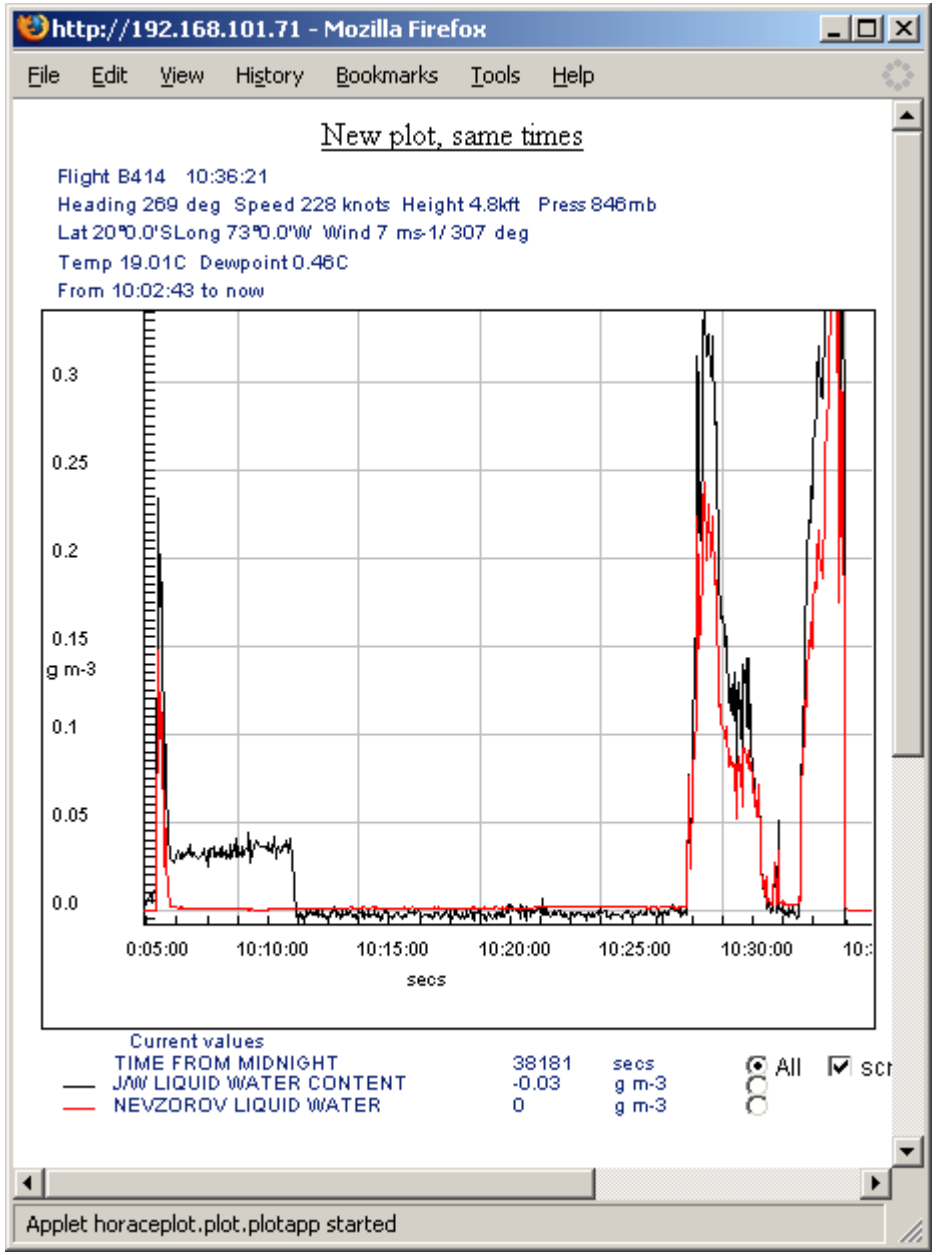
R2.3 “in-cloud” but now out of cloud CB lifted



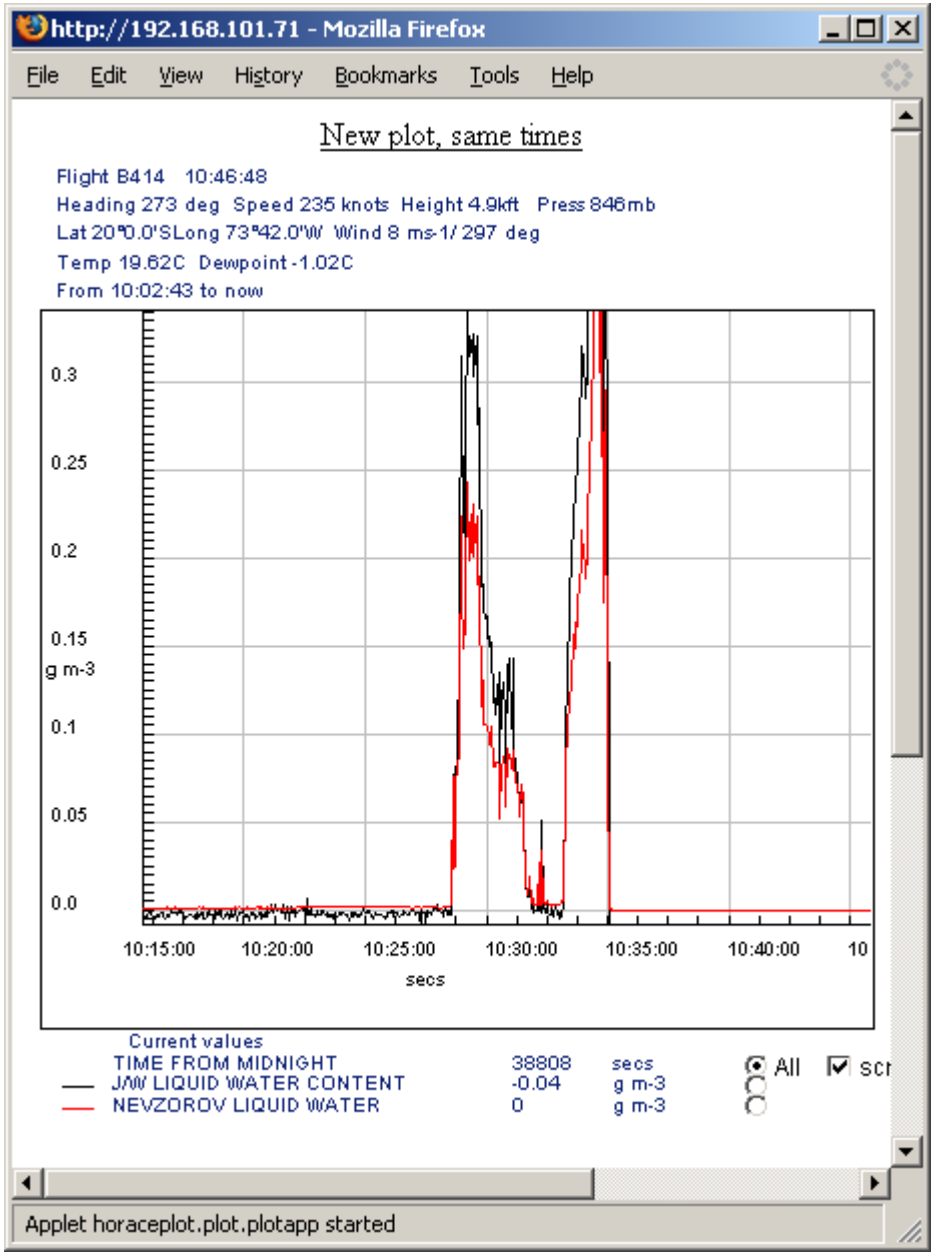
NB Not Recording DATAAAAAAAA from 1034 til 13 05ish

2DS crashed – reinitialise s/w set

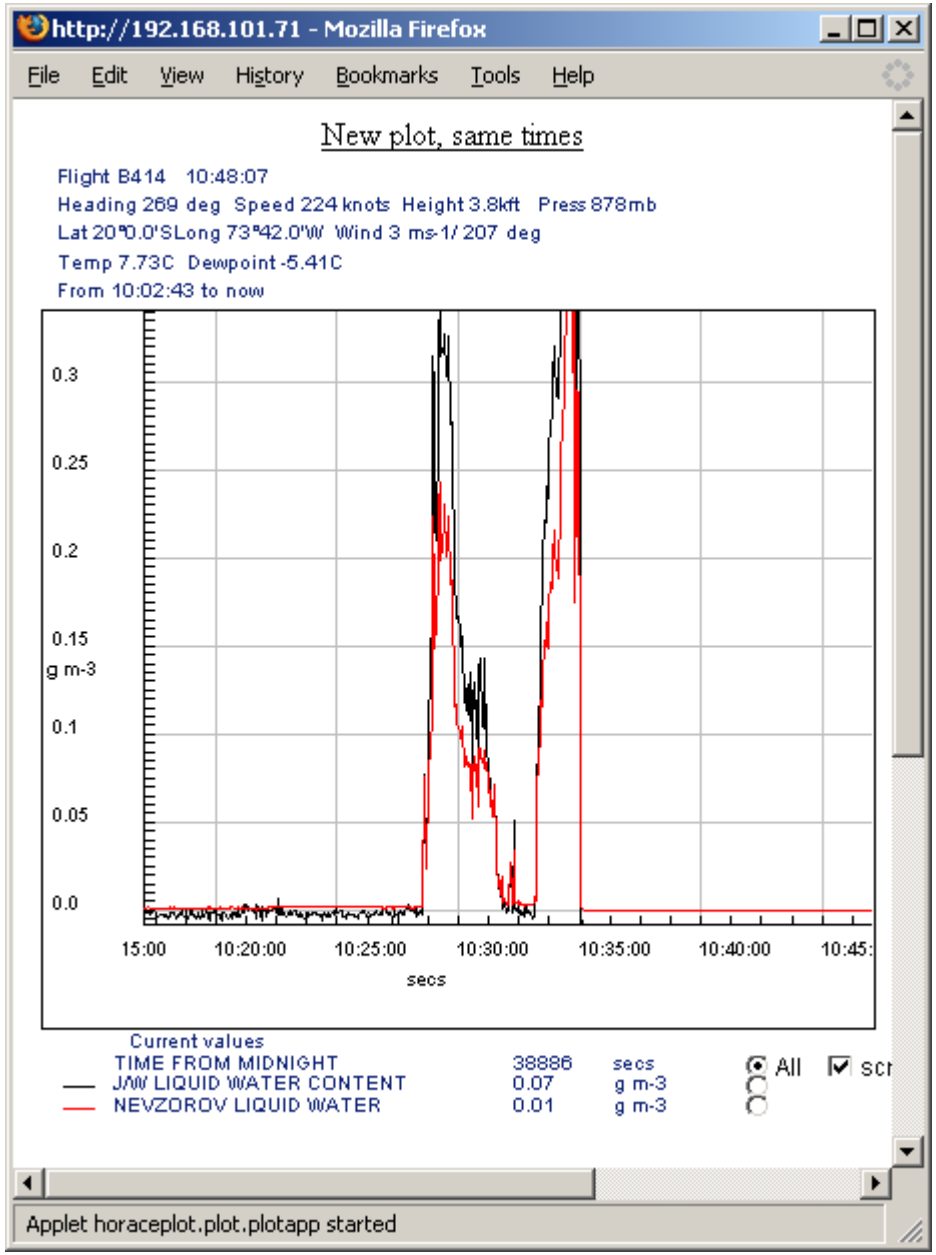
2DS crash reinitialise s/w new mask looks OK now



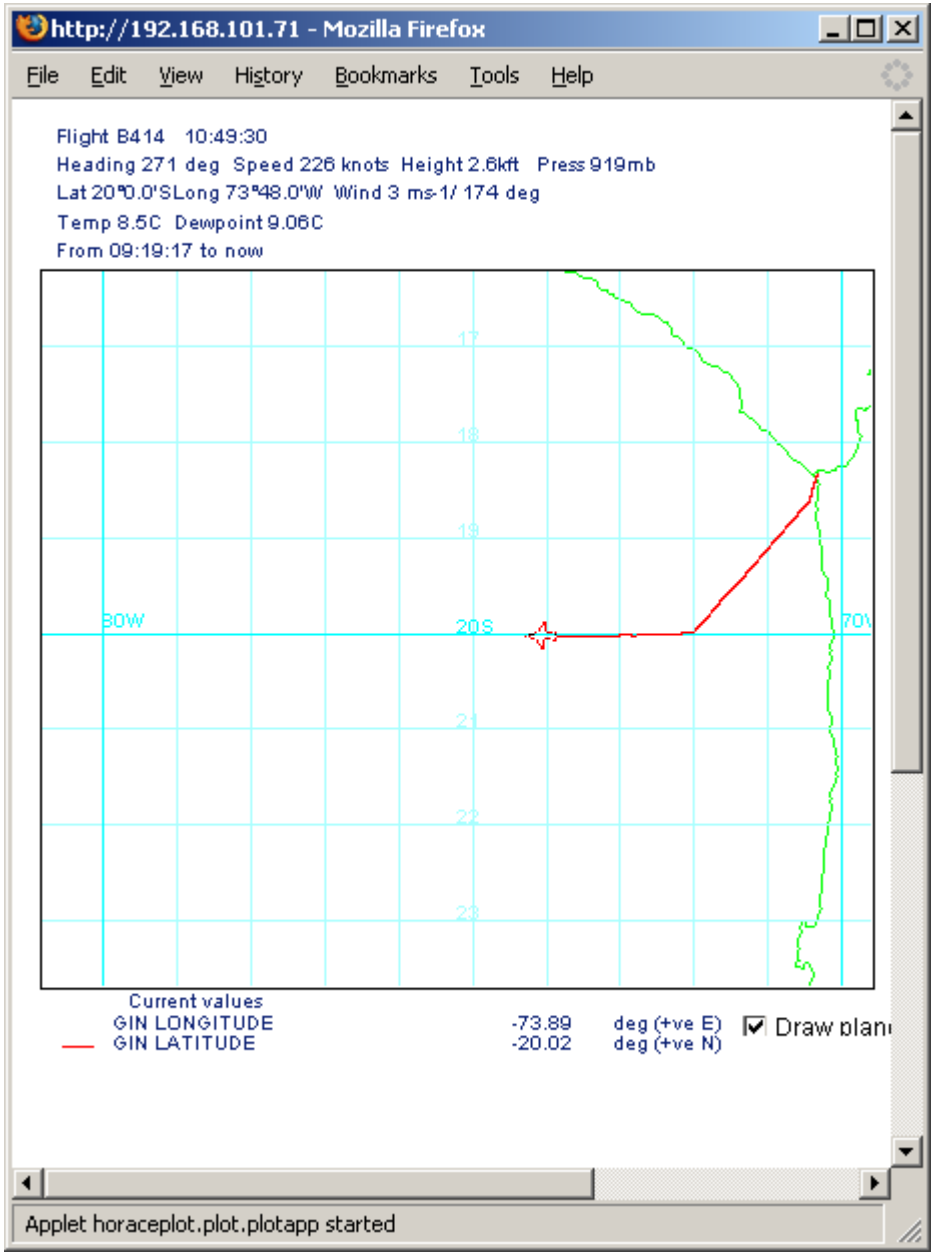
End P4 start run 2.4



End R2.4 start P5 down to 500ft



CT about 4100ft on 1018 mb



P5 CB 2900 on 1018

DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 10:53:25

(0) CIP Grayscale (1) CAS (2) Hotwire_LWC (3) SPP_200 Setup

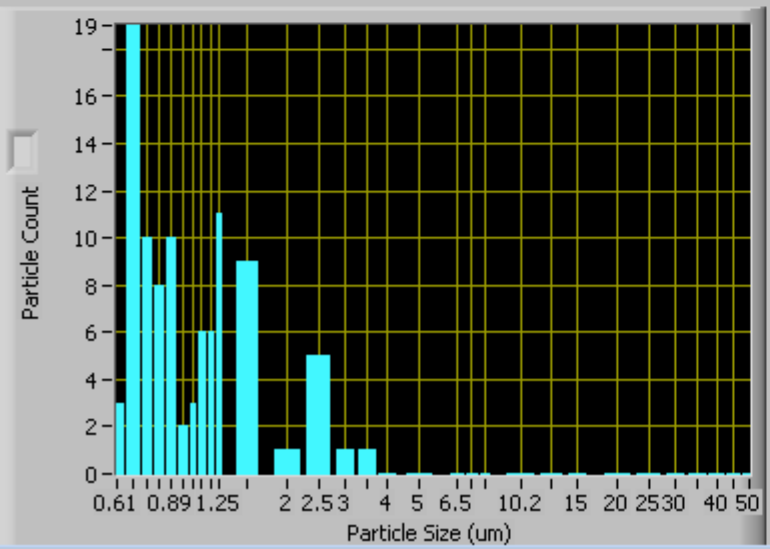
Enable Enabled

COM Port 4 No Fault v2.5.3

CAS Data CAS Housekeeping

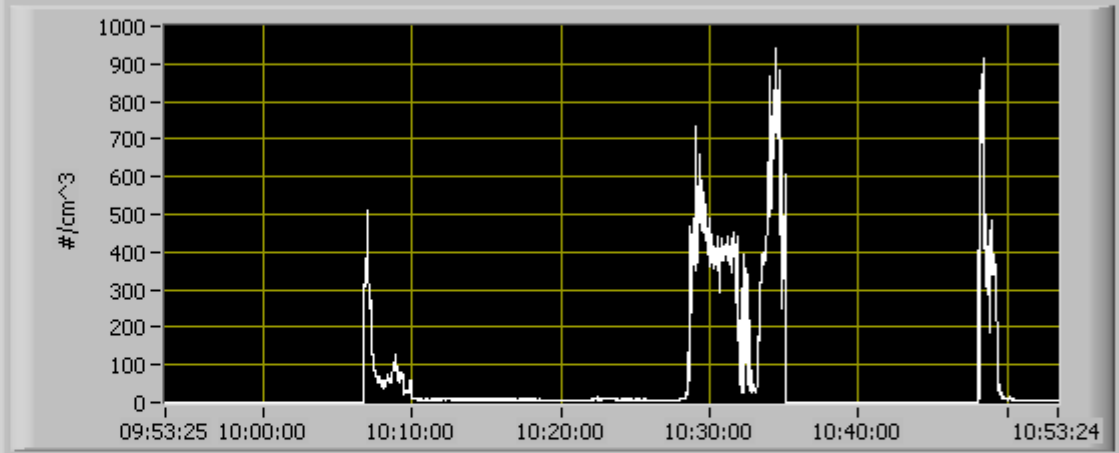
#Conc (#/cm^3) 4.05	Sum of Particles 1507	LWC Hotwire (V) 1.07
CAS LWC (g/m^3) 0	Forward Overflow 0	LWC Slave Mon (V) 0.3
CAS MVD (um) 2.1	Backward Overflow 0	Laser Curr Mon (mA) 87.7
CAS ED(um) 1.6	Ambient Temp (C) NaN	Laser Pwr Mon (V) 43
Dynamic Pressure 0	Static Pressure 0	Airspeed (m/s) 93.9

Forward Scattering Backward Scattering

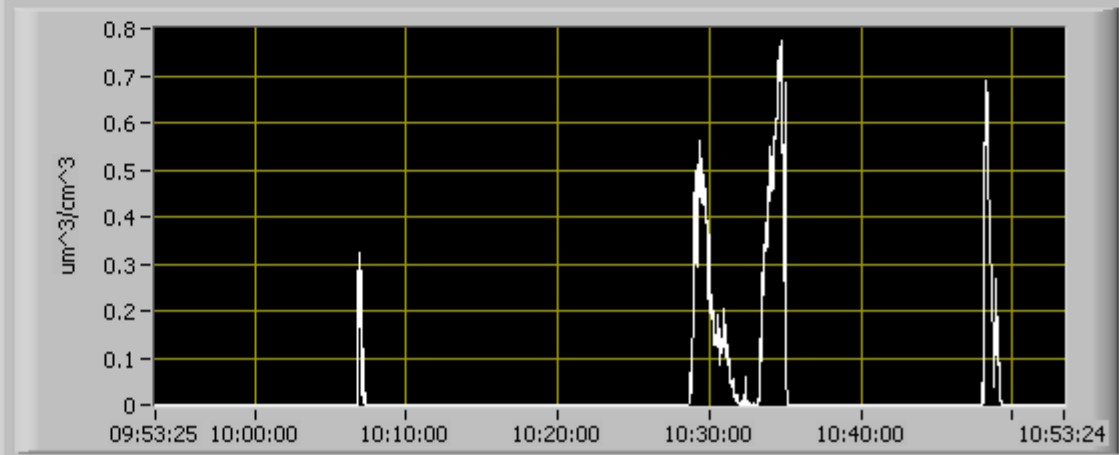


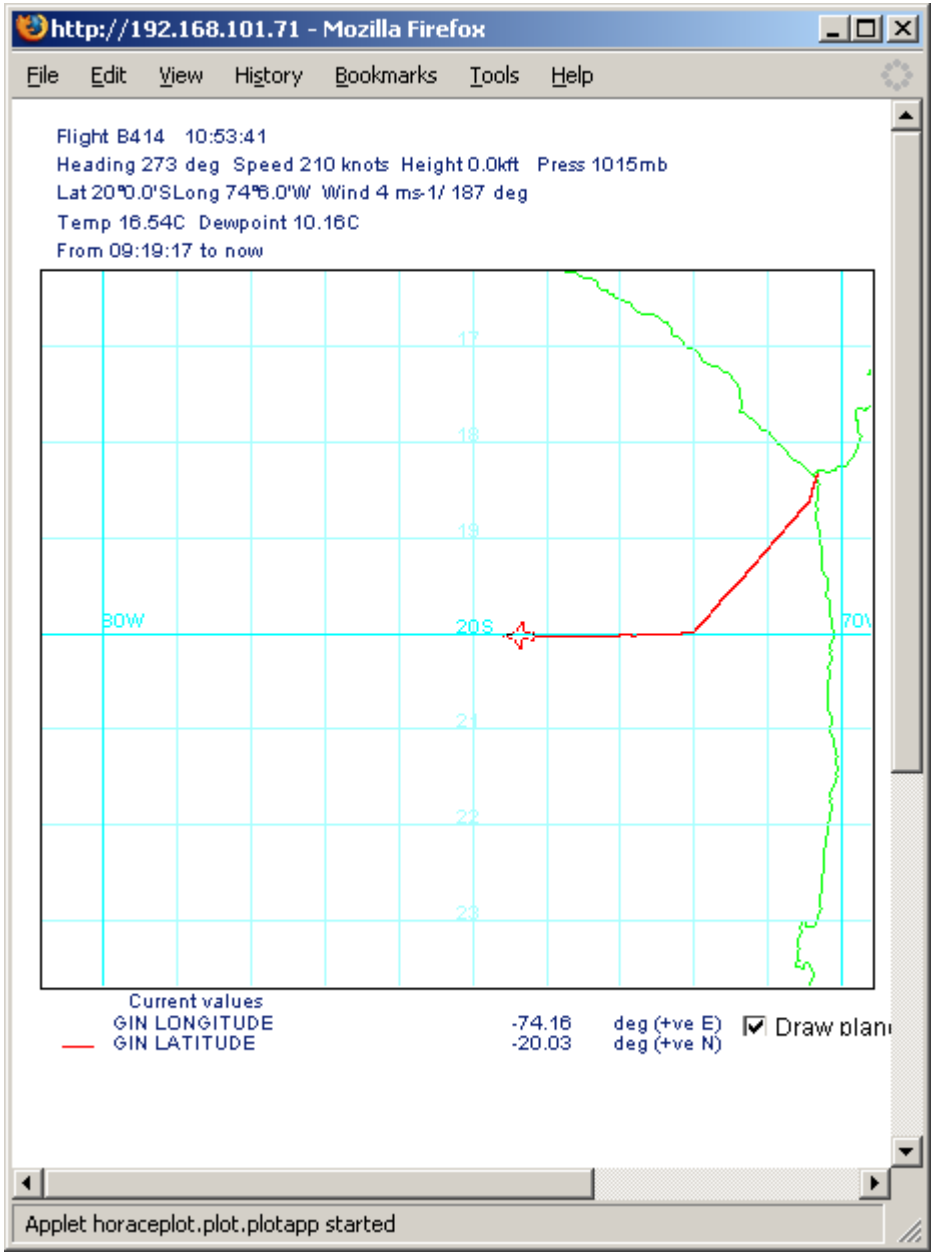
Standard Charts Selectable Charts Forward/Backscatter

CAS # Conc

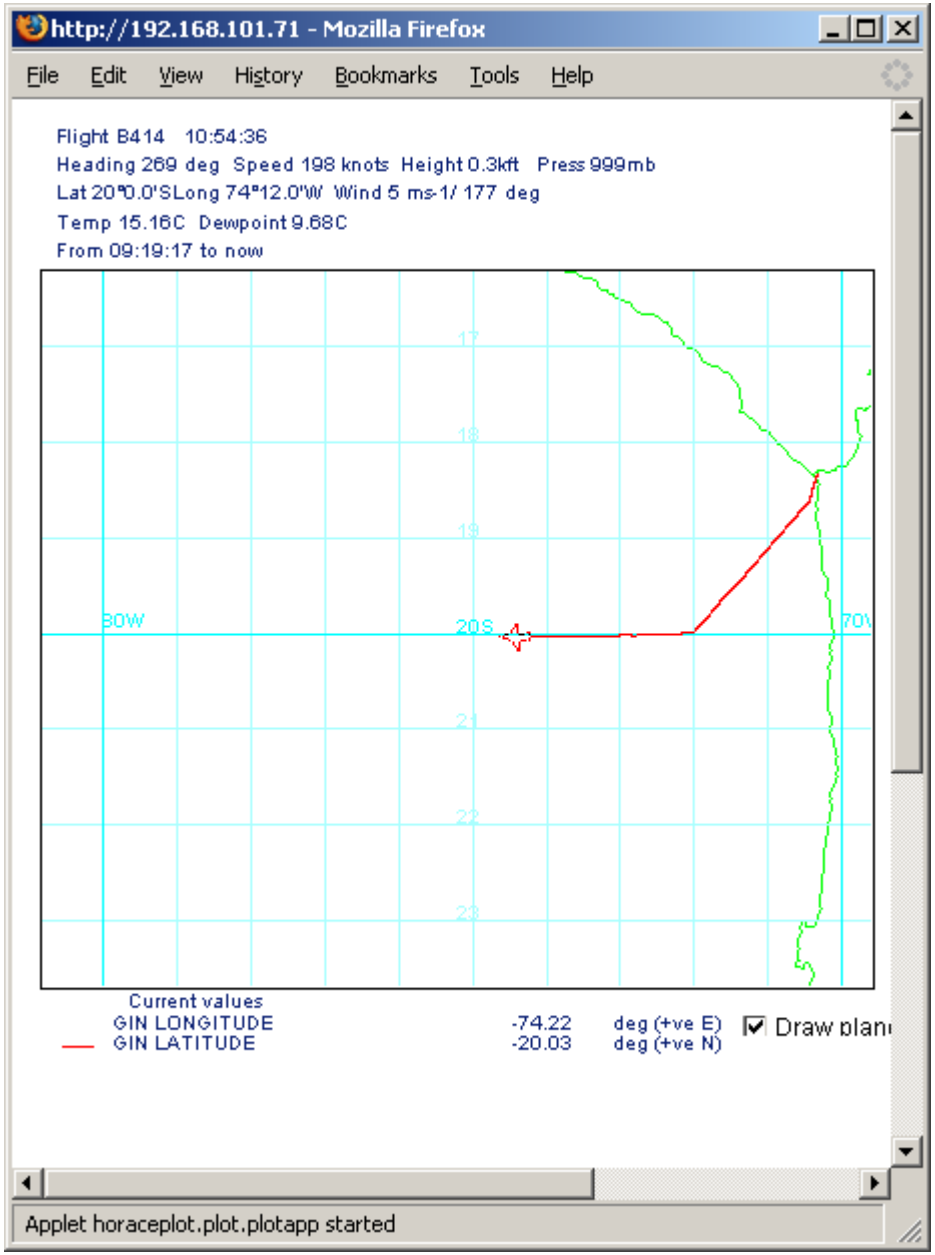


CAS Volume Conc





End P5 at 50ft start P6 to 500ft



end P6 start R3.1 at 500ft

DMT Particle Analysis and Display System

Program Configure

Sampling | Recording | Read a File

Display Range: All

00 d 10:57:41

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

Enable: Enabled

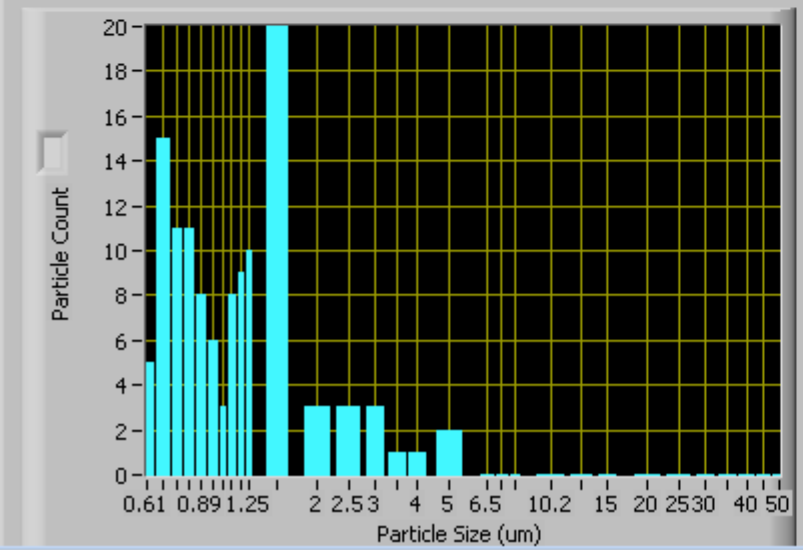
COM Port: 4 — No Fault

v2.5.3

CAS Data | CAS Housekeeping

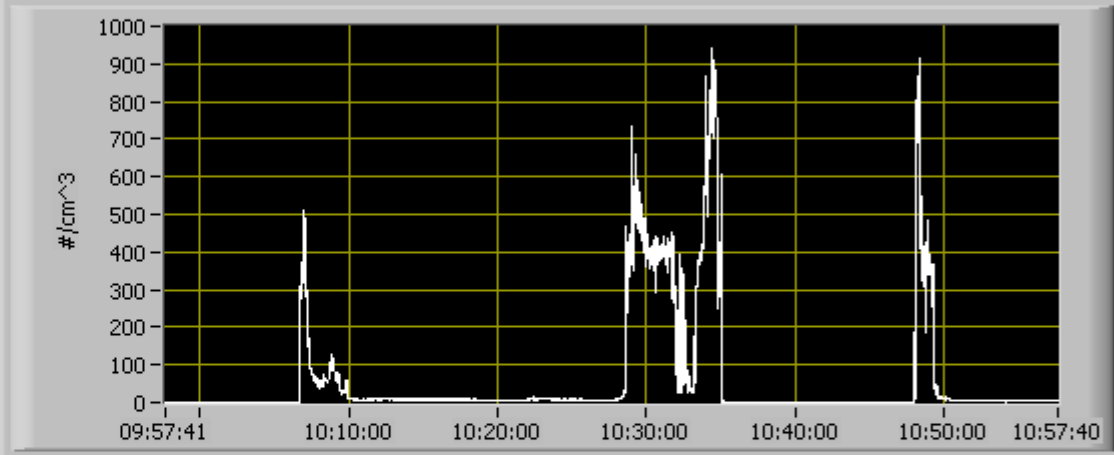
#Conc (#/cm^3): 5.07	Sum of Particles: 1638	LWC Hotwire (V): 1.12
CAS LWC (g/m^3): 0	Forward Overflow: 0	LWC Slave Mon (V): 0.32
CAS MVD (um): 3.27	Backward Overflow: 0	Laser Curr Mon (mA): 87.5
CAS ED(um): 2.28	Ambient Temp (C): NaN	Laser Pwr Mon (V): 43
Dynamic Pressure: 0	Static Pressure: 0	Airspeed (m/s): 93.8

Forward Scattering | Backward Scattering

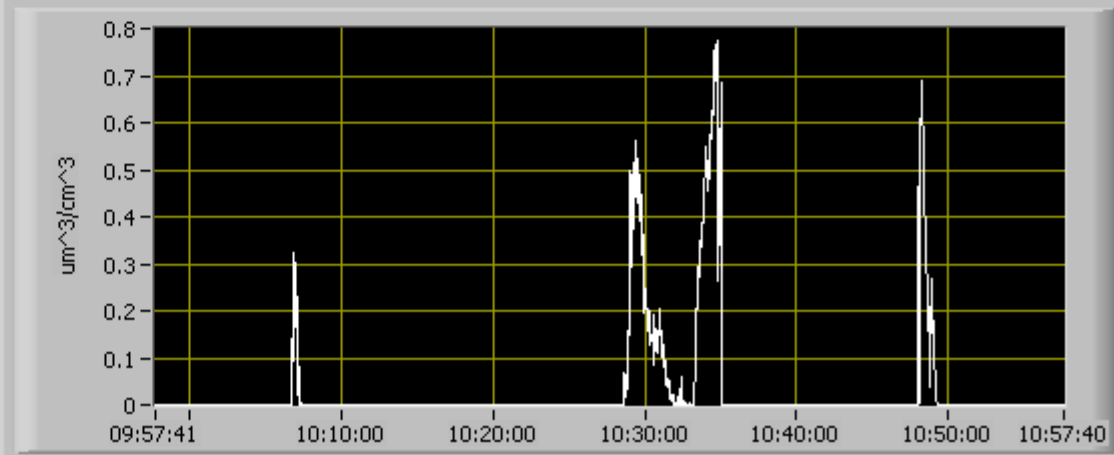


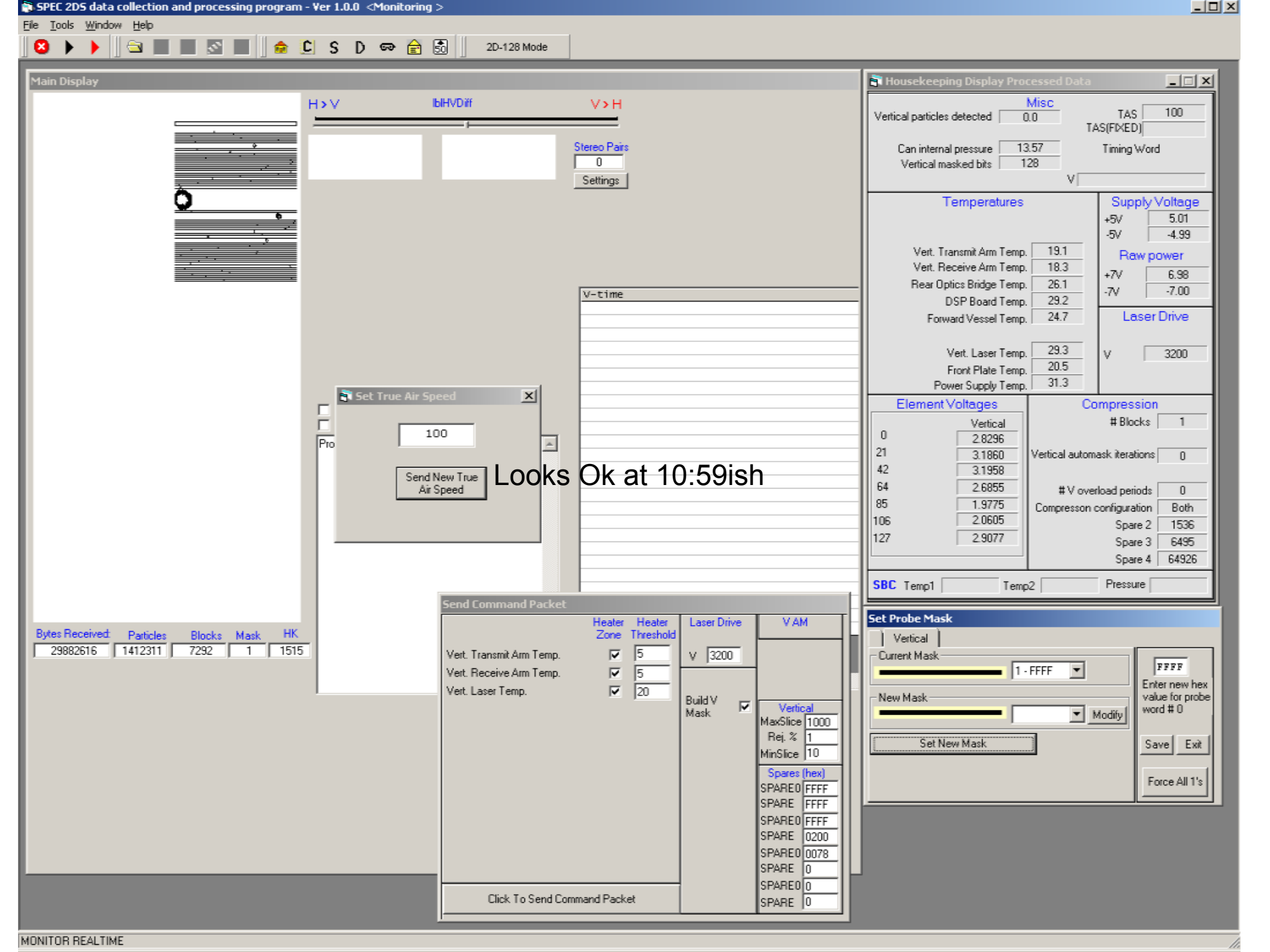
Standard Charts | Selectable Charts | Forward/Backscatter

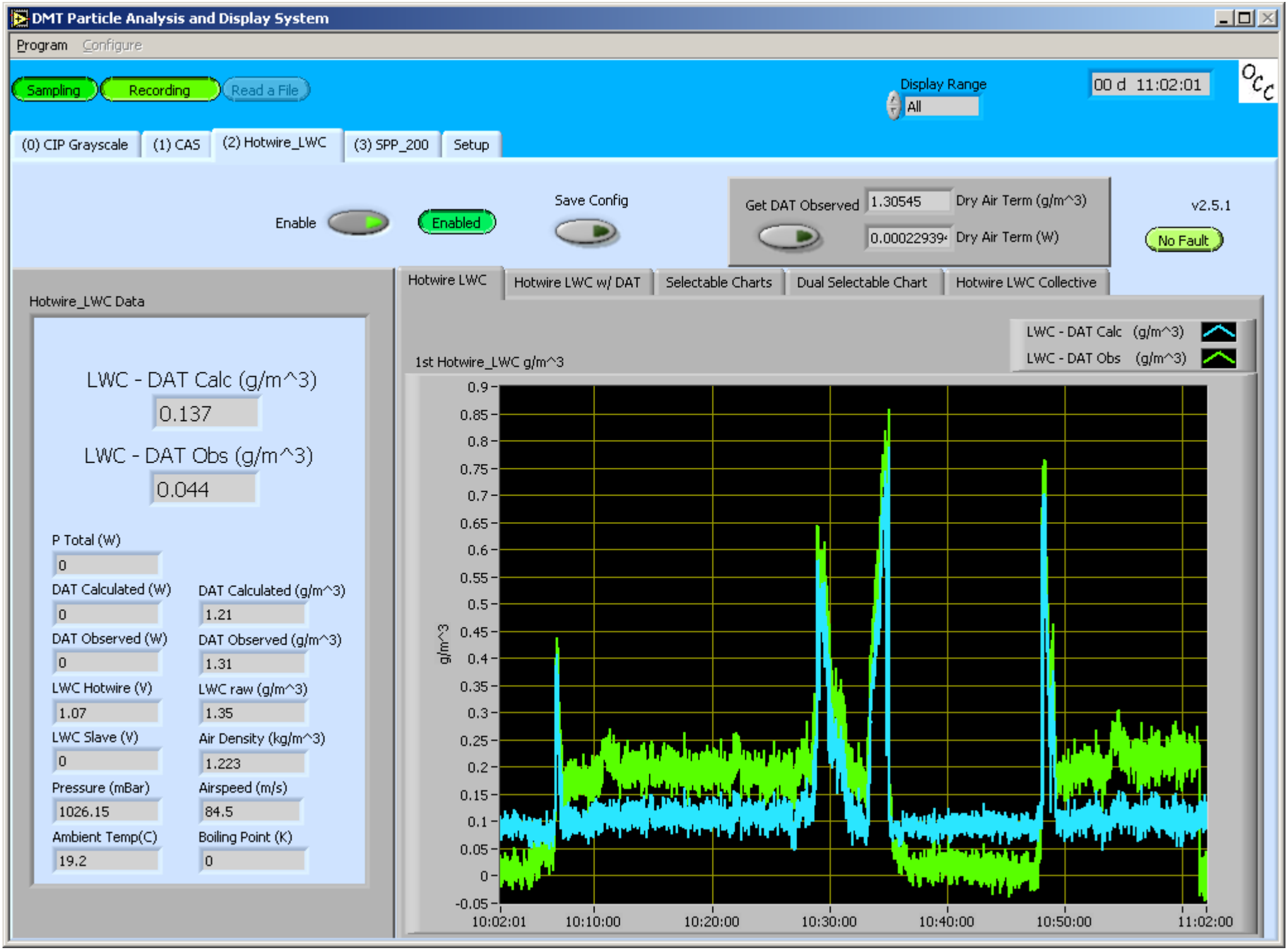
CAS # Conc



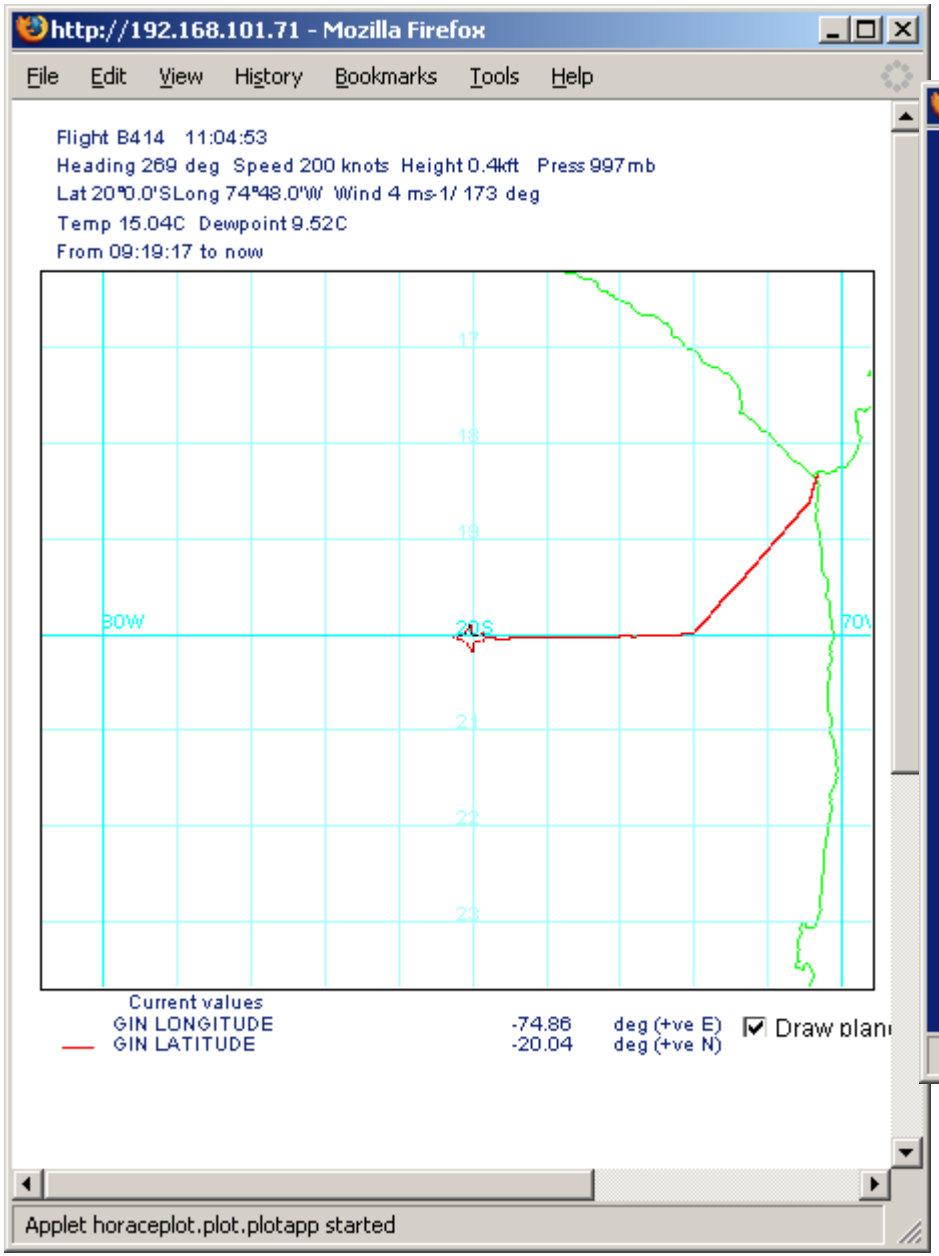
CAS Volume Conc



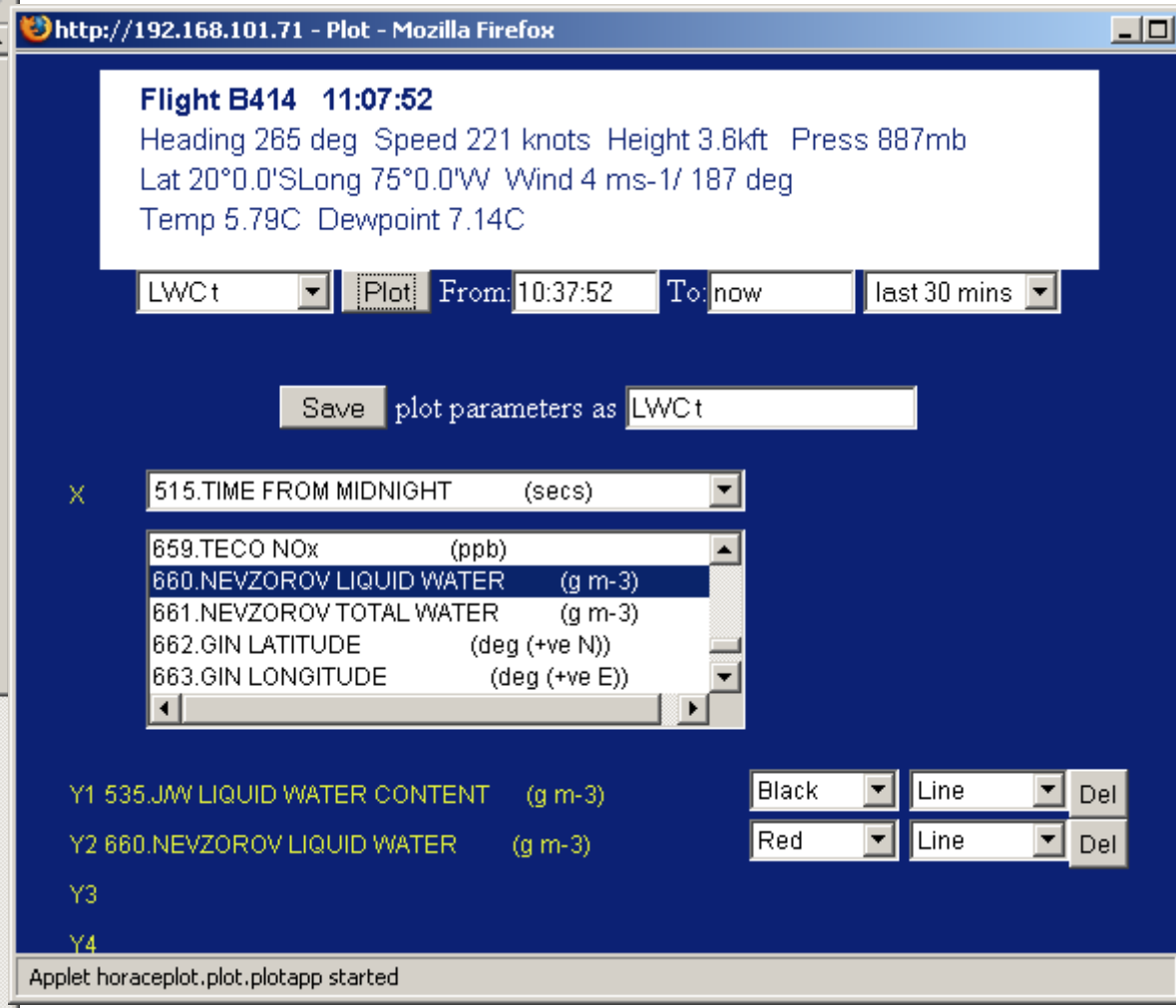

SPEC 2DS data collection and processing program - Ver 1.0.0 <Monitoring >
File Tools Window Help
2D-128 Mode
Main Display
H > V
lblHVDiff
V > H
Stereo Pairs
0
Settings
Bytes Received
29882616
Particles
1412311
Blocks
7292
Mask
1
HK
1515
V-time
Set True Air Speed
100
Send New True Air Speed
Looks Ok at 10:59ish
Housekeeping Display Processed Data
Misc
Vertical particles detected
0.0
TAS
100
TAS(FIXED)
Can internal pressure
13.57
Timing Word
Vertical masked bits
128
V
Temperatures
Vert. Transmit Arm Temp.
19.1
Vert. Receive Arm Temp.
18.3
Rear Optics Bridge Temp.
26.1
DSP Board Temp.
29.2
Forward Vessel Temp.
24.7
Vert. Laser Temp.
29.3
Front Plate Temp.
20.5
Power Supply Temp.
31.3
Supply Voltage
+5V
5.01
-5V
-4.99
Raw power
+7V
6.98
-7V
-7.00
Laser Drive
V
3200
Element Voltages
Vertical
0
2.8296
21
3.1860
42
3.1958
64
2.6855
85
1.9775
106
2.0605
127
2.9077
Compression
Blocks
1
Vertical automask iterations
0
V overload periods
0
Compresson configuration
Both
Spare 2
1536
Spare 3
6495
Spare 4
64926
SBC
Temp1
Temp2
Pressure
Send Command Packet
Heater Zone
Heater Threshold
Laser Drive
V AM
Vert. Transmit Arm Temp.
5
Vert. Receive Arm Temp.
5
Vert. Laser Temp.
20
V
3200
Build V Mask
Vertical
MaxSlice
1000
Rej. %
1
MinSlice
10
Spares (hex)
SPARE0
FFFF
SPARE
FFFF
SPARE0
FFFF
SPARE
0200
SPARE0
0078
SPARE
0
SPARE0
0
SPARE
0
Click To Send Command Packet
Set Probe Mask
Vertical
Current Mask
1 - FFFF
New Mask
Modify
Set New Mask
FFFF
Enter new hex value for probe word # 0
Save
Exit
Force All 1's
MONITOR REALTIME



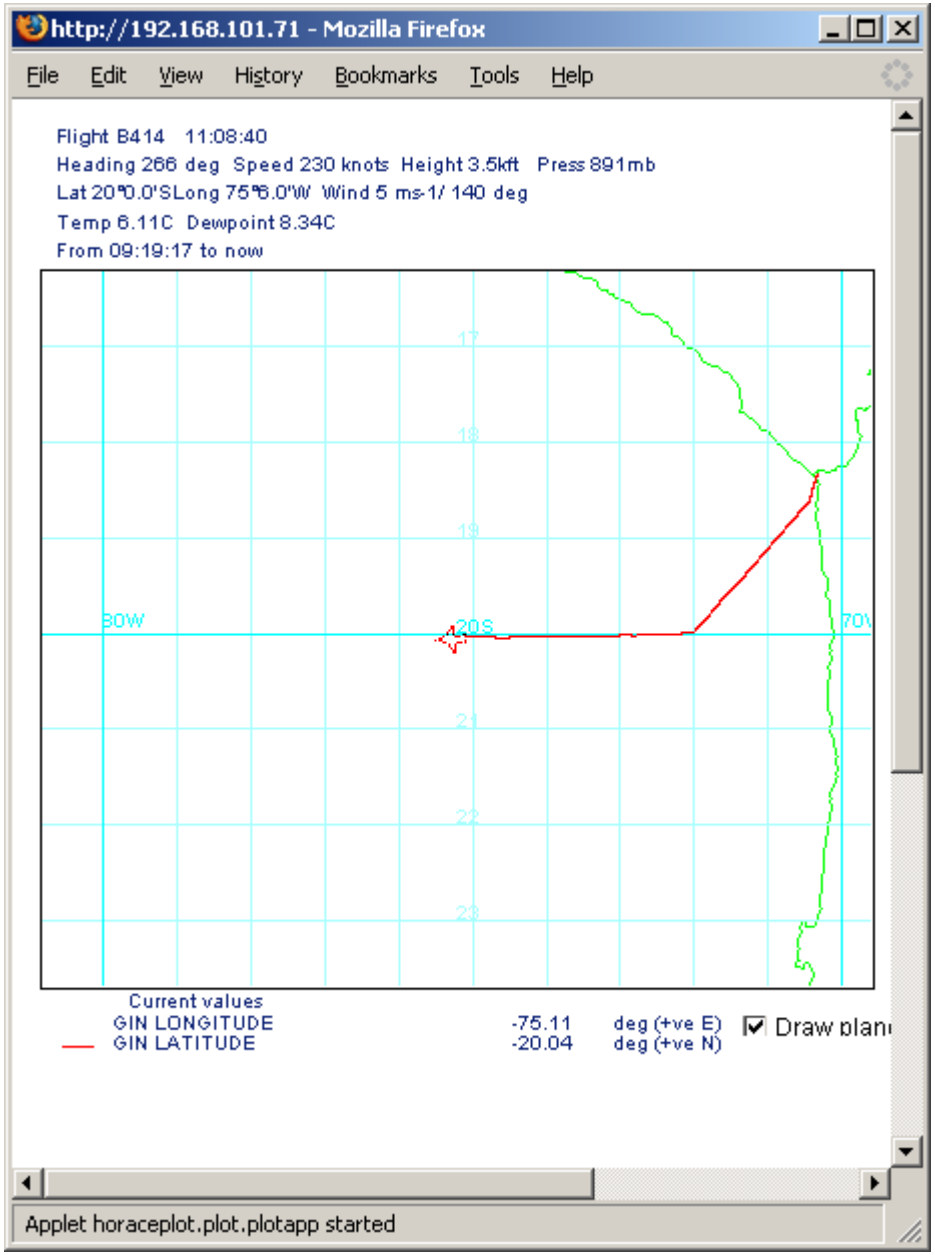
Zeroed but slave V is 0.0 still



End R3.1 at 500ft start P7



P7 end R3.2 start incloud run



R3.2 incloud started 11:08:30 still in CTs

DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 11:10:38

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

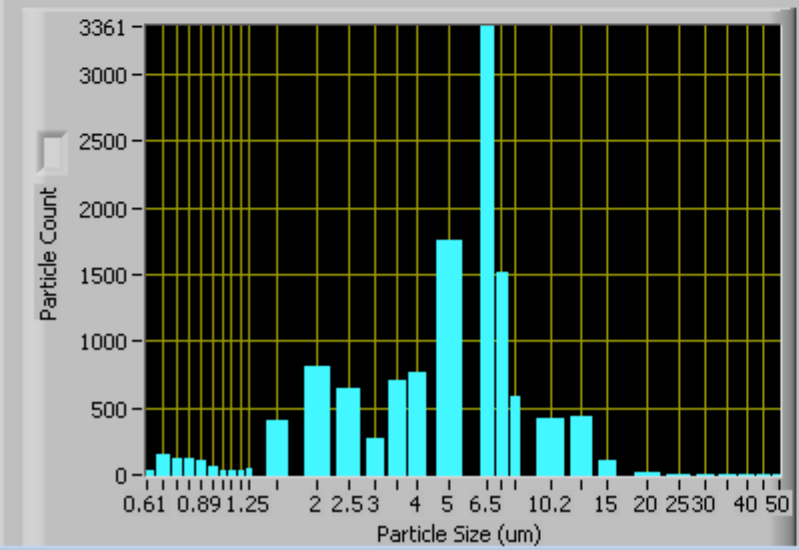
Enable Enabled

COM Port 4 No Fault v2.5.3

CAS Data | CAS Housekeeping

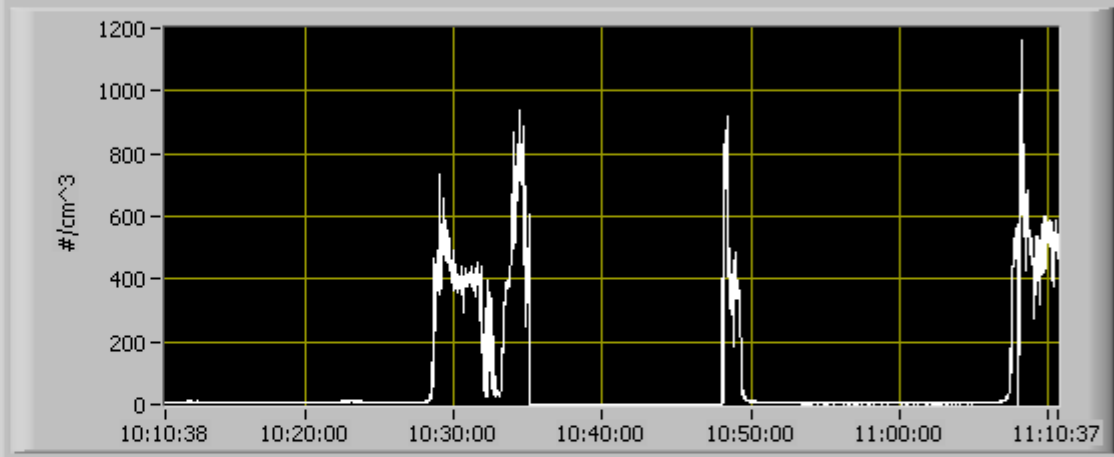
#Conc (#/cm^3) 518.56	Sum of Particles 47480	LWC Hotwire (V) 1.21
CAS LWC (g/m^3) 0.06	Forward Overflow 0	LWC Slave Mon (V) 0.32
CAS MVD (um) 7.53	Backward Overflow 0	Laser Curr Mon (mA) 87.5
CAS ED(um) 7.53	Ambient Temp (C) NaN	Laser Pwr Mon (V) 43
Dynamic Pressure 0	Static Pressure 0	Airspeed (m/s) 96.4

Forward Scattering | Backward Scattering

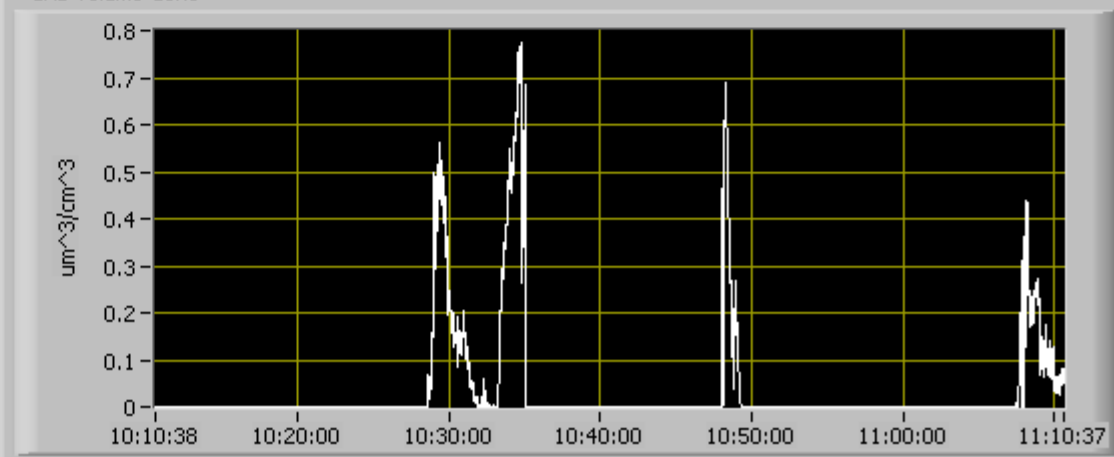


Standard Charts | Selectable Charts | Forward/Backscatter

CAS # Conc



CAS Volume Conc

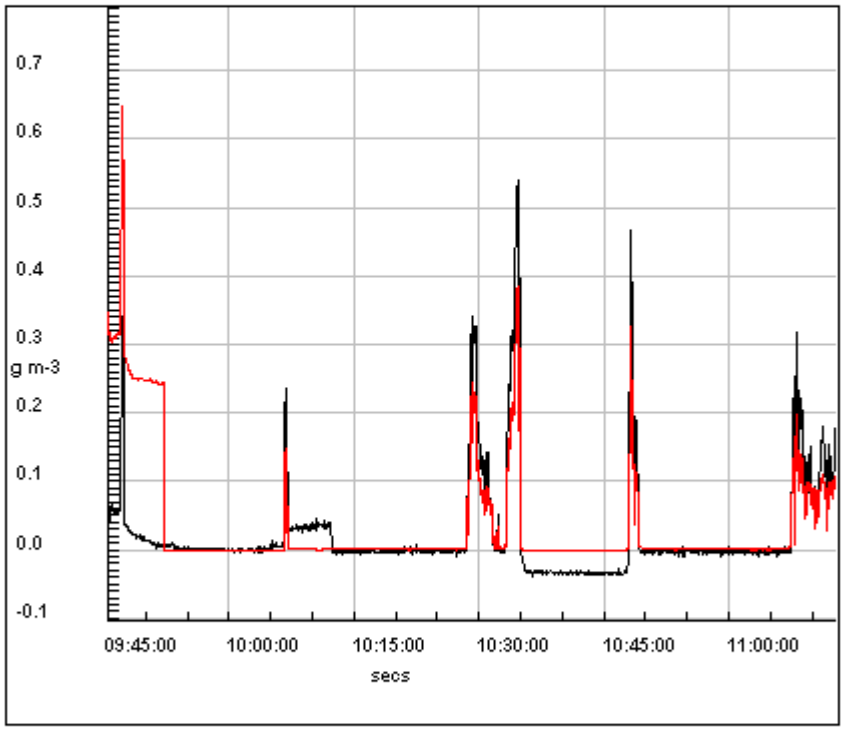


http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

New plot, same times

Flight B414 11:13:30
Heading 264 deg Speed 219 knots Height 3.5kft Press 891mb
Lat 20°0.0'S Long 75°24.0'W Wind 4 ms-1/ 162 deg
Temp 5.29C Dewpoint 6.88C
From start to now



Current values

	TIME FROM MIDNIGHT	40410	secs
—	JW LIQUID WATER CONTENT	0.08	g m-3
—	NEVZOROV LIQUID WATER	0.07	g m-3

All scr

Applet horaceplot.plot.plotapp started

DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 11:14:54

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

CIP GS Data | CIP GS Housekeeping | CIP GS Cal

Enable

Enabled

COM Port 3

No Fault

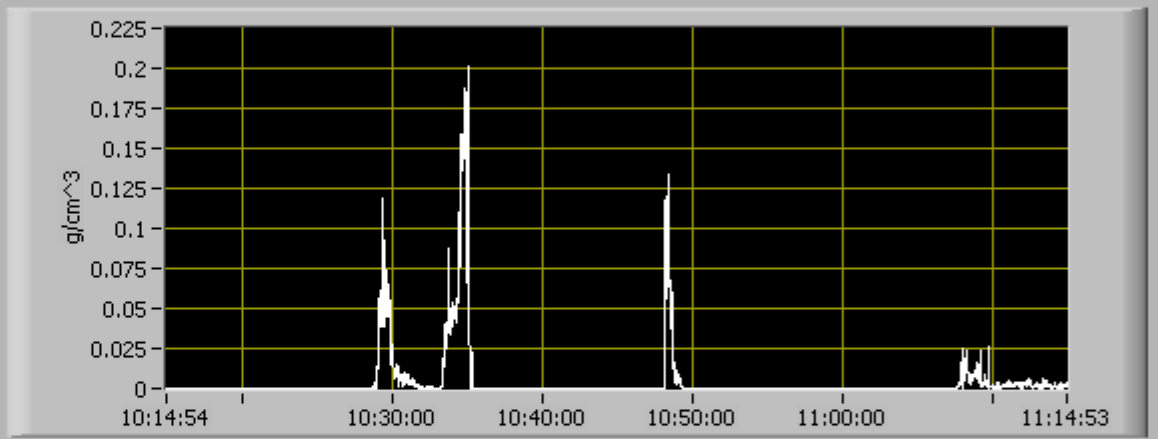
v2.6.5

CIP GS # Conc/LWC | CIP GS Realtime Images | CIP GS Selectable Charts | Full Hist. | Diode Voltages

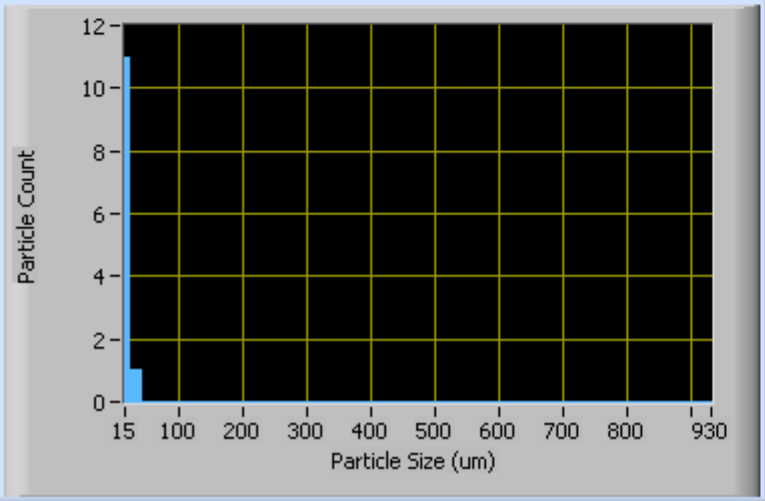
Numb Conc (cts/cm^3)	0.39
LWC (g/cm^3)	0
MVD (um)	8.33
ED (um)	19
Oversize Reject Count	0
DOF Reject Count	0
End Reject Count	0
Particle Counter	12

Diode 1 V	Diode 32 V	Diode 64 V
2.4	2.47	2.55

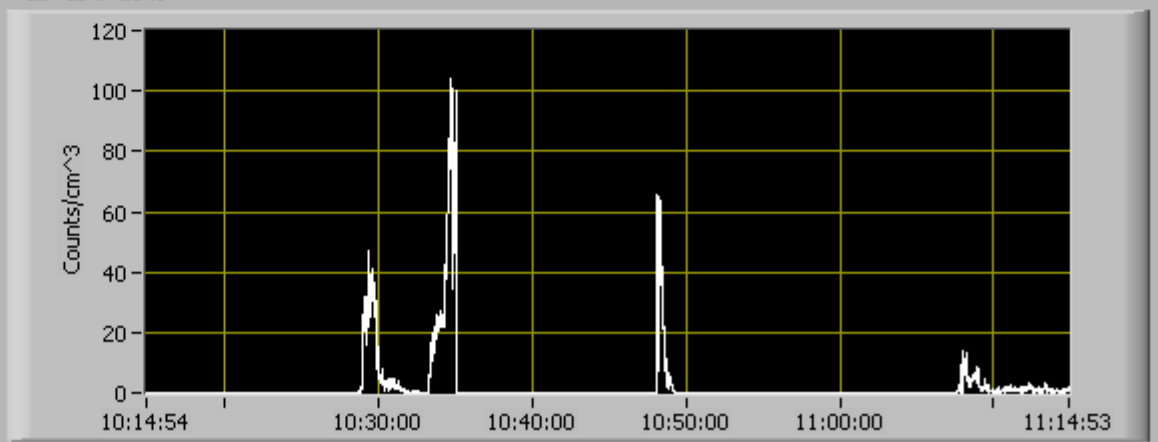
CIP GS LWC



CIP Grayscale Particle Counter

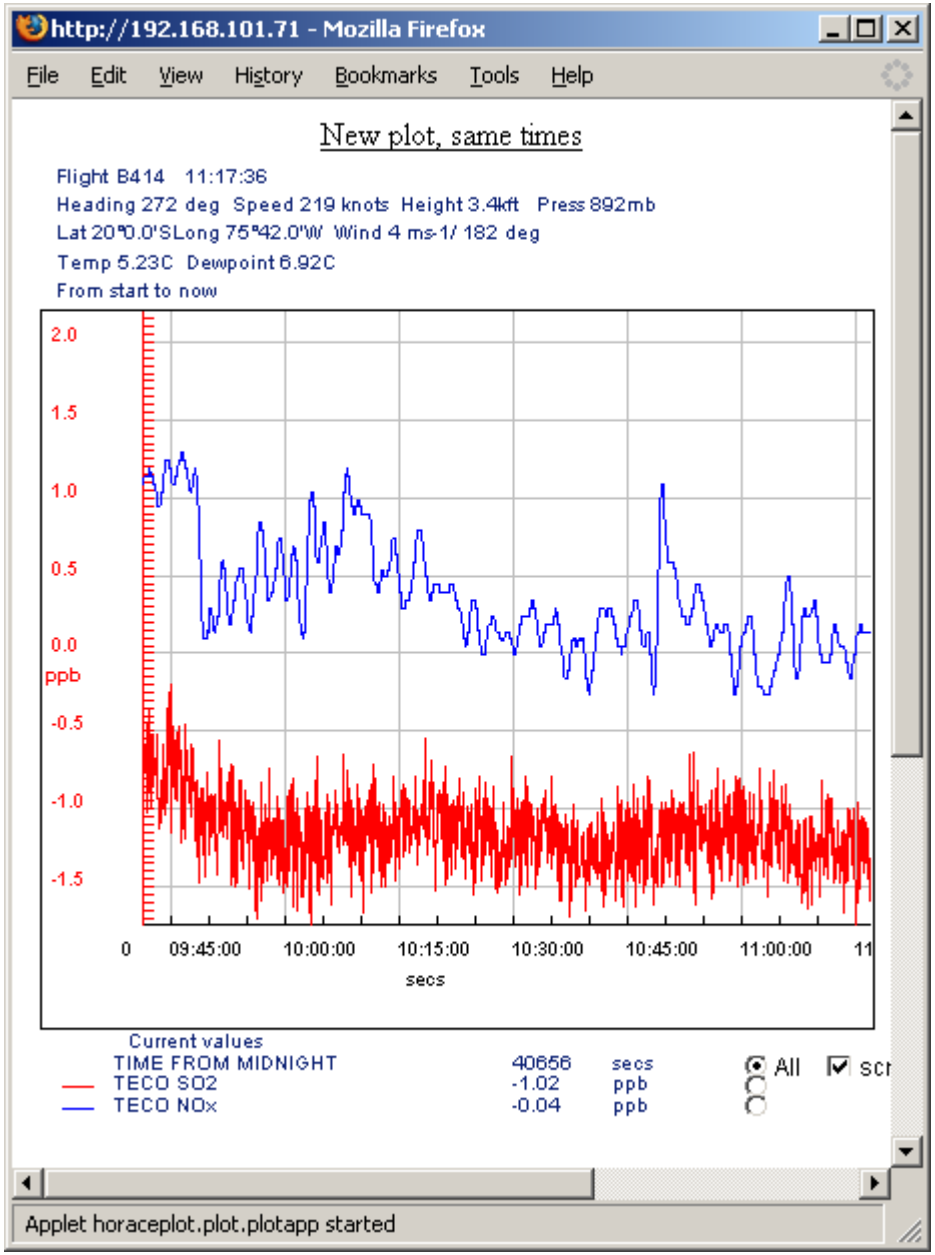


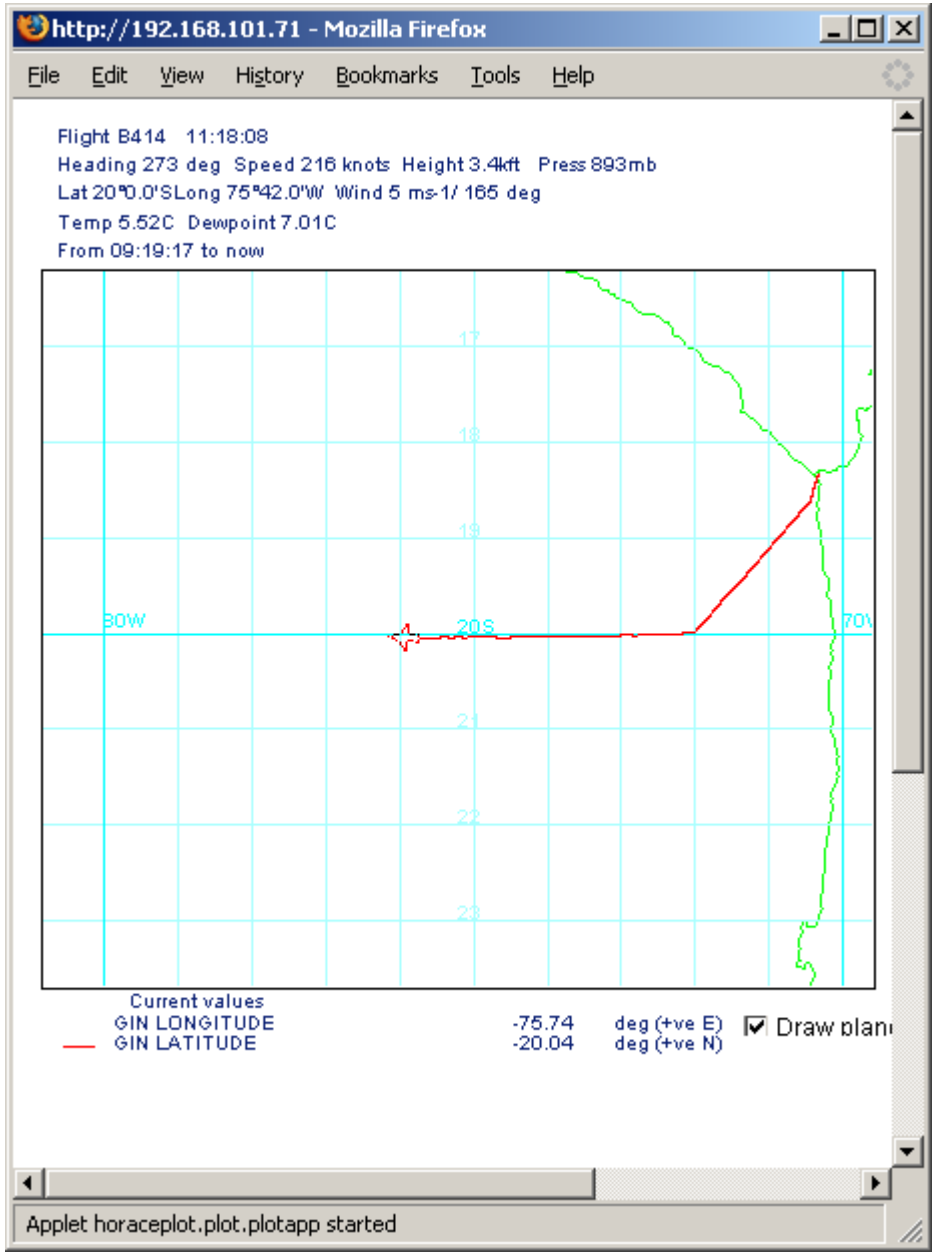
CIP GS # Conc

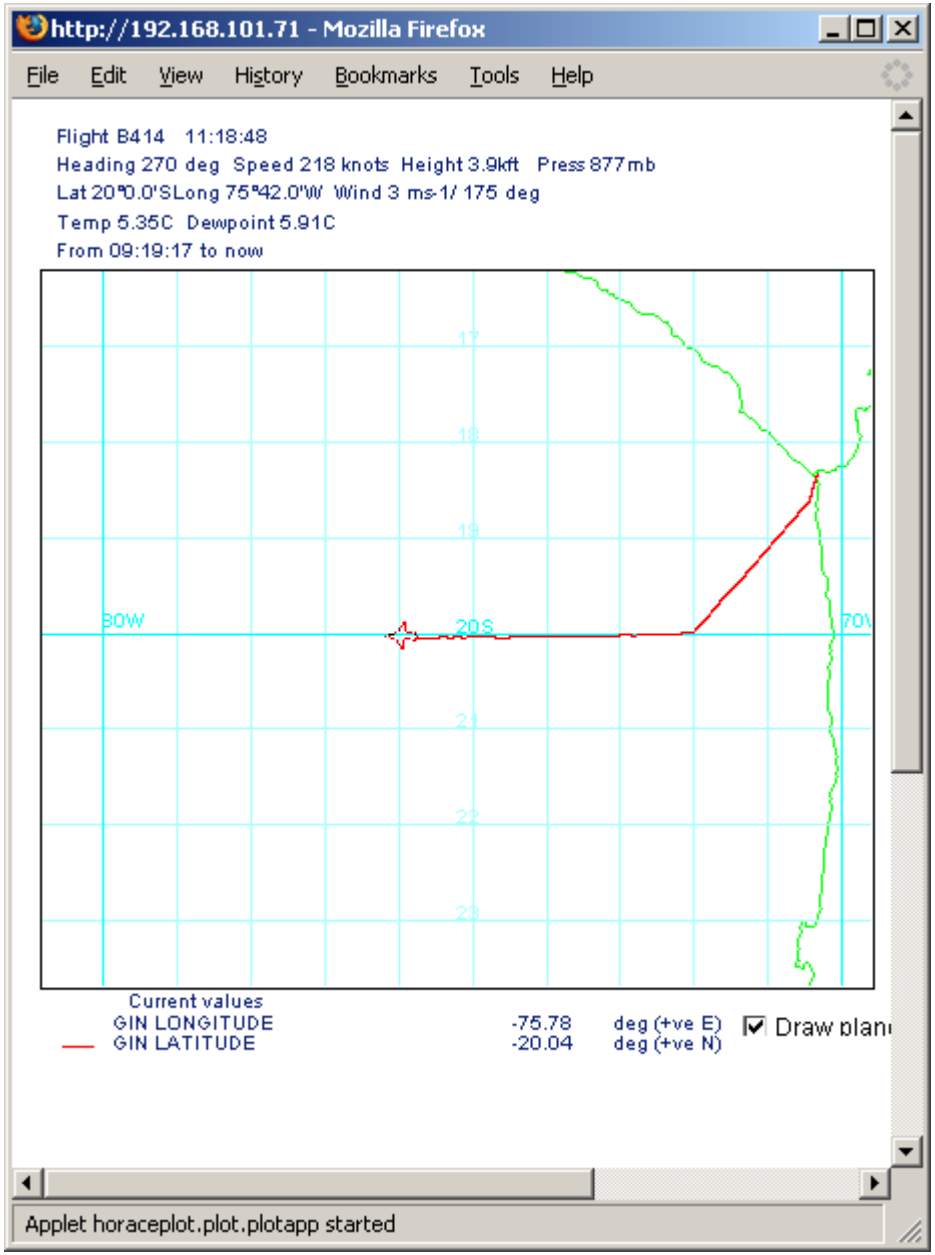



DMT Particle Analysis and Display System
Program
Configure
Sampling
Recording
Read a File
Display Range
All
00 d 11:15:29
(0) CIP Grayscale
(1) CAS
(2) Hotwire_LWC
(3) SPP_200
Setup
Enable
Enabled
Save Config
Get DAT Observed
1.30545
Dry Air Term (g/m^3)
0.00022939
Dry Air Term (W)
v2.5.1
No Fault
Hotwire_LWC Data
LWC - DAT Calc (g/m^3)
0.151
LWC - DAT Obs (g/m^3)
-0.009
P Total (W)
0
DAT Calculated (W)
0
DAT Calculated (g/m^3)
1.15
DAT Observed (W)
0
DAT Observed (g/m^3)
1.31
LWC Hotwire (V)
1.21
LWC raw (g/m^3)
1.3
LWC Slave (V)
0
Air Density (kg/m^3)
1.13
Pressure (mBar)
920.9
Airspeed (m/s)
98.1
Ambient Temp(C)
10.9
Boiling Point (K)
0
Hotwire LWC
Hotwire LWC w/ DAT
Selectable Charts
Dual Selectable Chart
Hotwire LWC Collective
LWC - DAT Calc (g/m^3)
LWC - DAT Obs (g/m^3)
1st Hotwire_LWC g/m^3
g/m^3
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
10:15:29
10:30:00
10:40:00
10:50:00
11:00:00
11:10:00
11:15:28

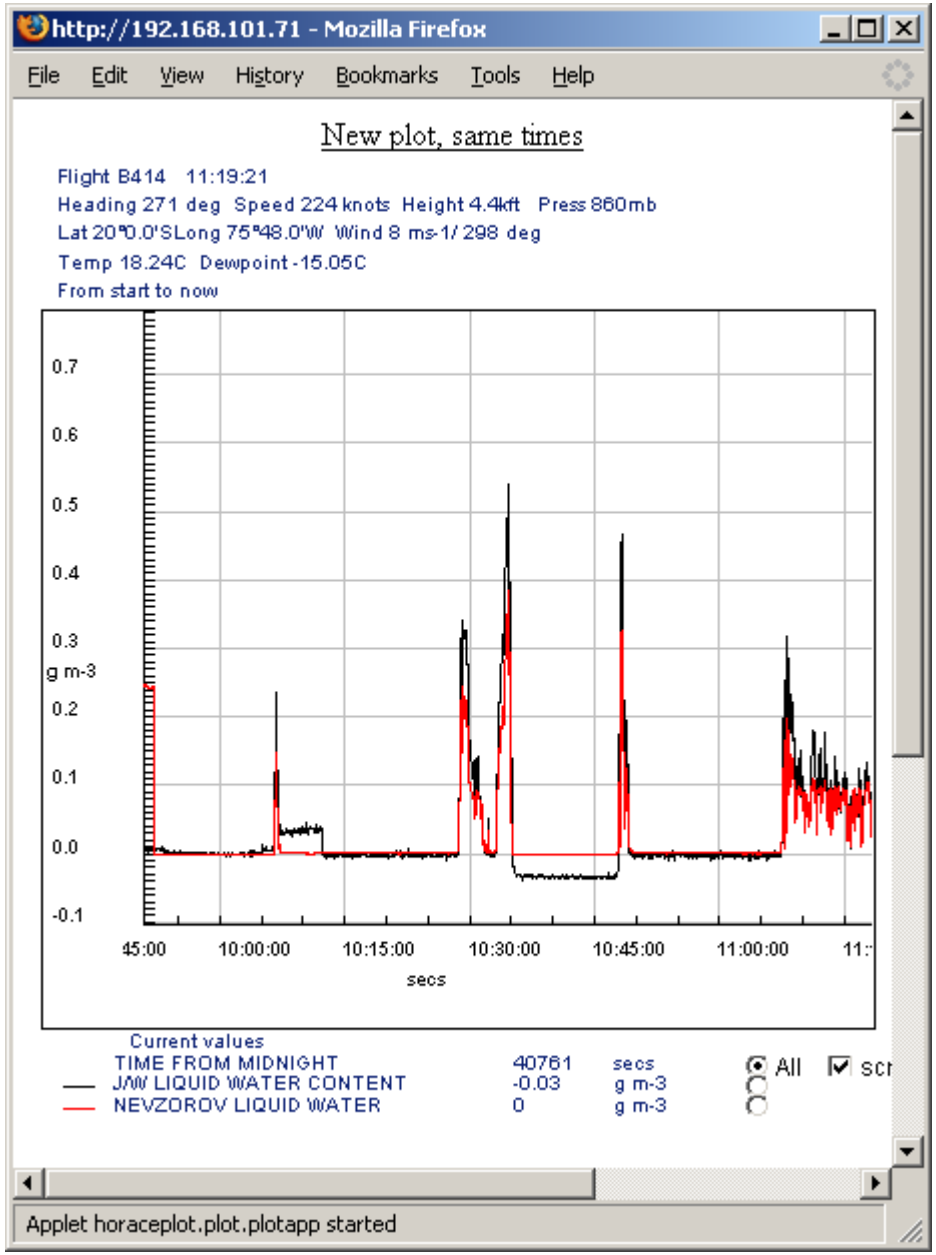
In cloud R3.2


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
New plot, same times
Flight B414 11:17:36
Heading 272 deg Speed 219 knots Height 3.4kft Press 892mb
Lat 20°0.0'S Long 75°42.0'W Wind 4 ms-1/ 182 deg
Temp 5.23C Dewpoint 6.92C
From start to now
2.0
1.5
1.0
0.5
0.0
ppb
-0.5
-1.0
-1.5
0
09:45:00
10:00:00
10:15:00
10:30:00
10:45:00
11:00:00
secs
Current values
TIME FROM MIDNIGHT 40656 secs
TECO SO2 -1.02 ppb
TECO NOx -0.04 ppb
All
Applet horaceplot.plot.plotapp started

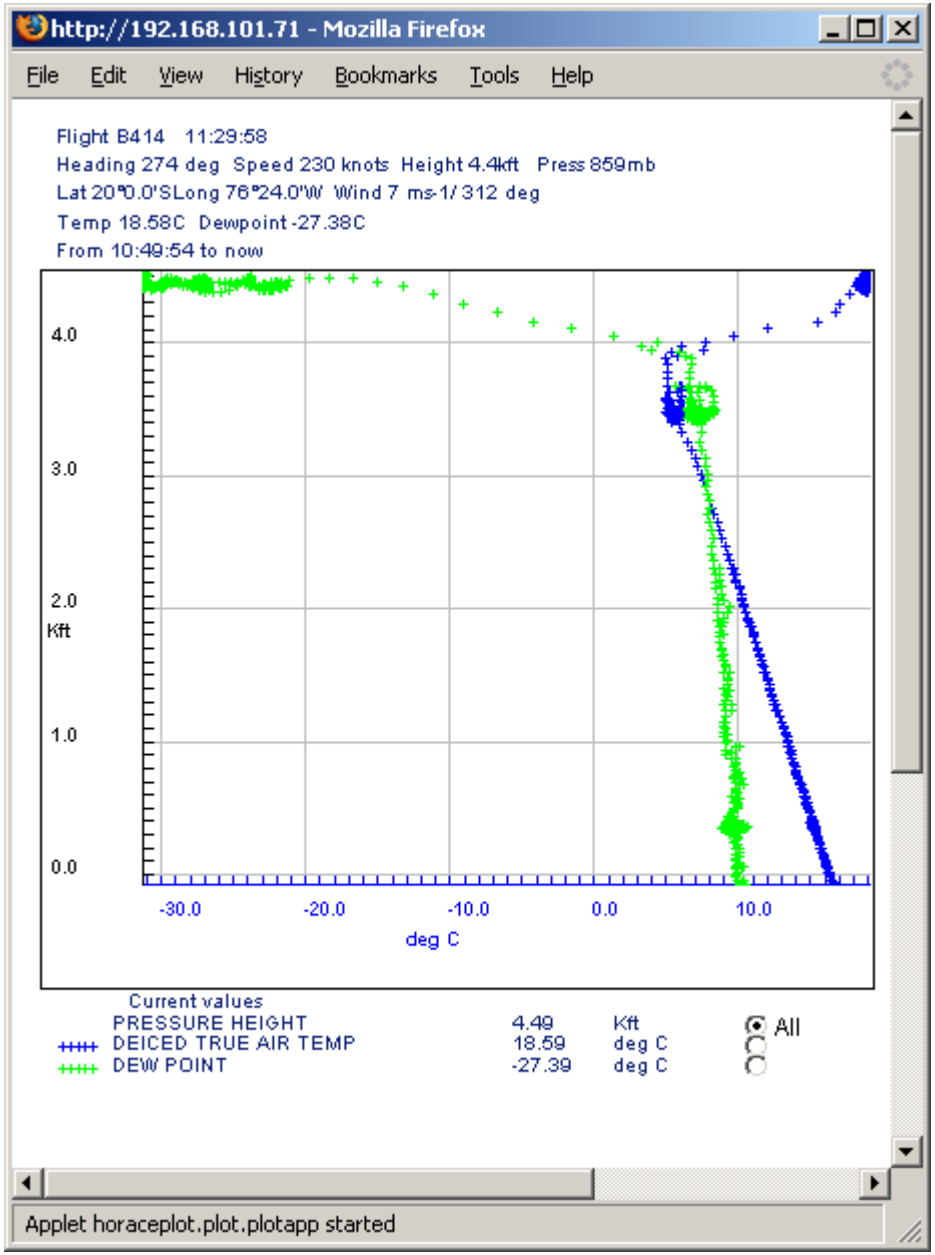

http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 11:18:08
Heading 273 deg Speed 216 knots Height 3.4kft Press 893mb
Lat 20°0.0'S Long 75°42.0'W Wind 5 ms-1/ 165 deg
Temp 5.52C Dewpoint 7.01C
From 09:19:17 to now
17
18
19
30W
20S
70W
21
22
23
Current values
GIN LONGITUDE -75.74 deg (+ve E)
GIN LATITUDE -20.04 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started



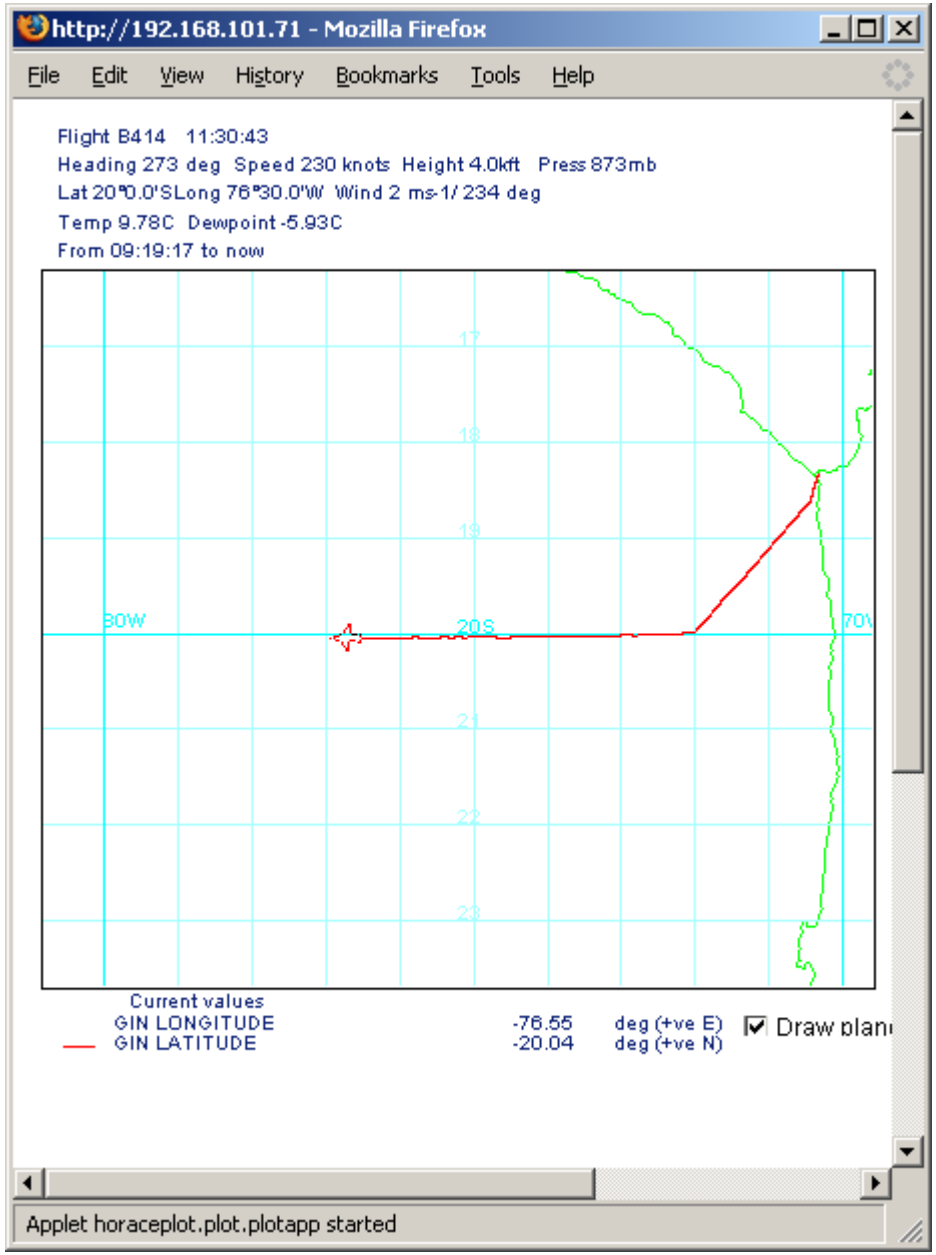
End R3.2 in cloud start P10



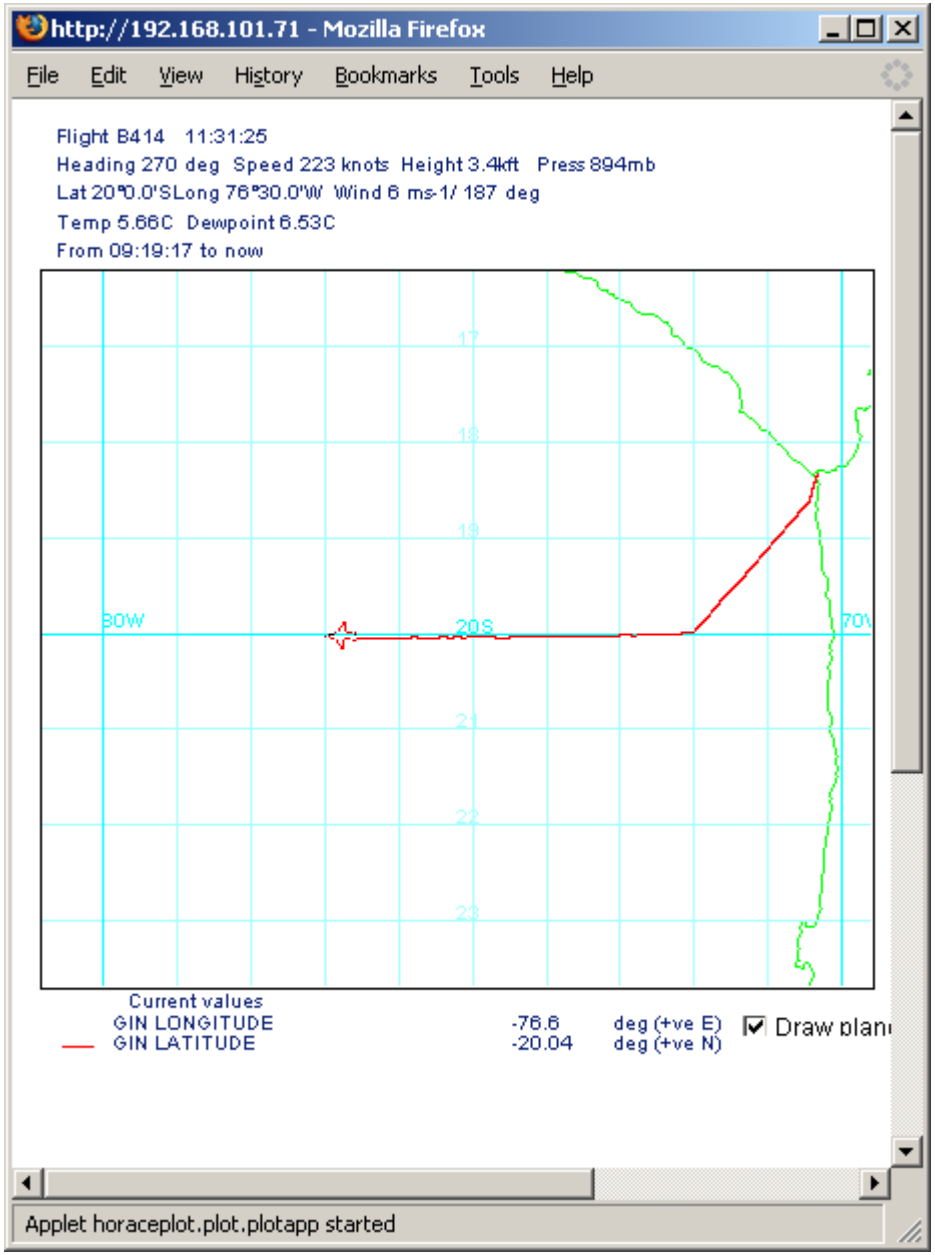
End P10 start R3.3 above CT

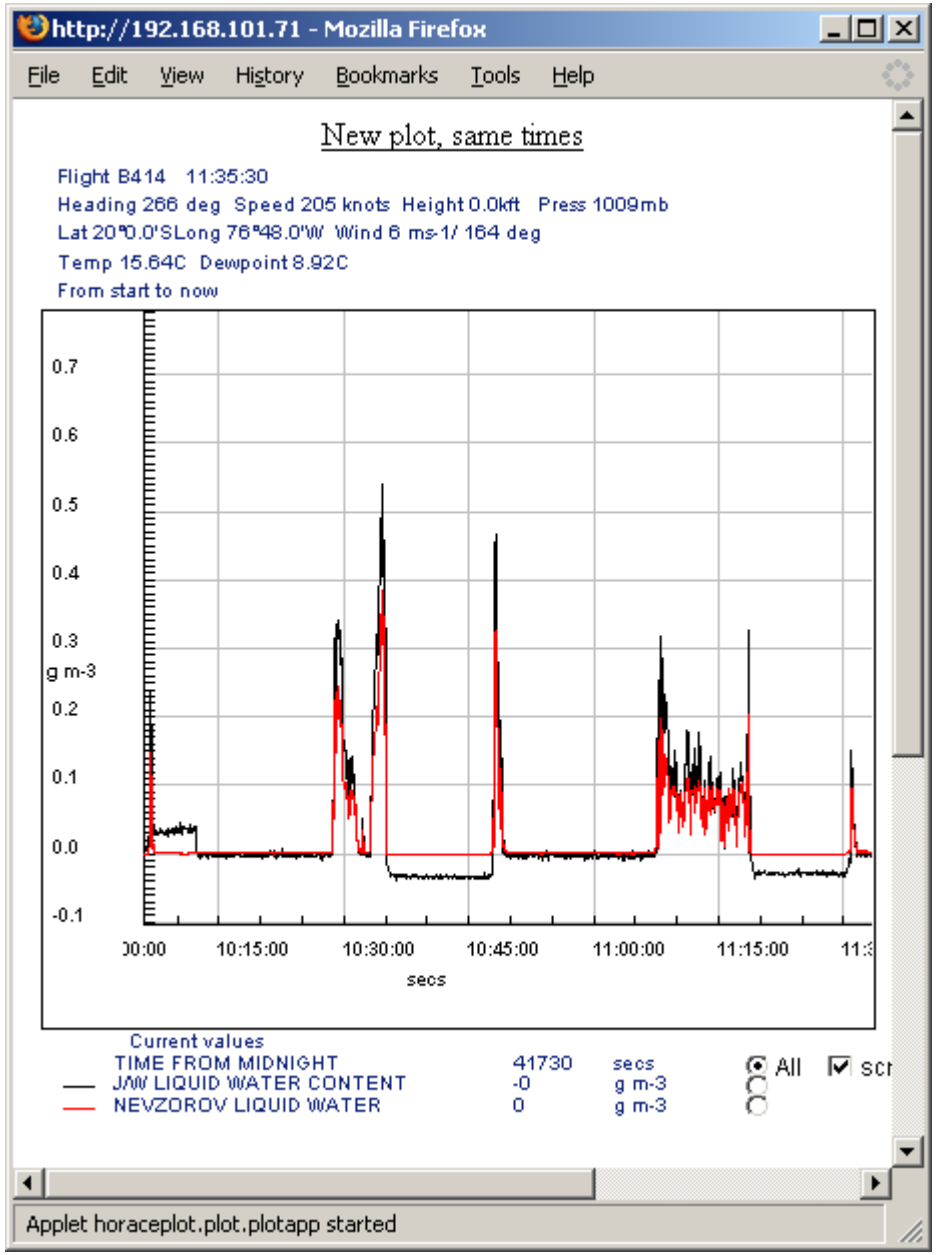


End R3.3 profile P11

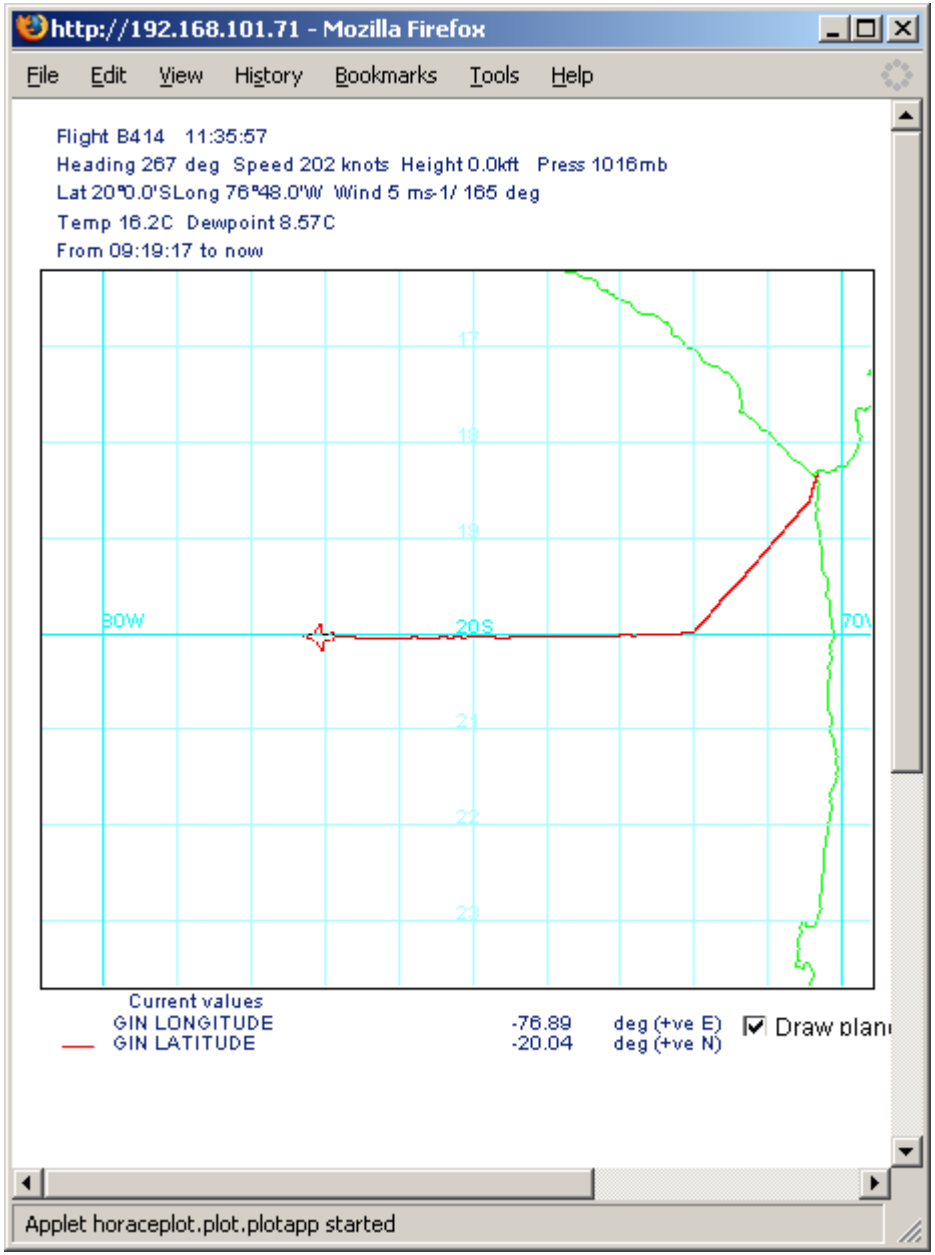


CT P11

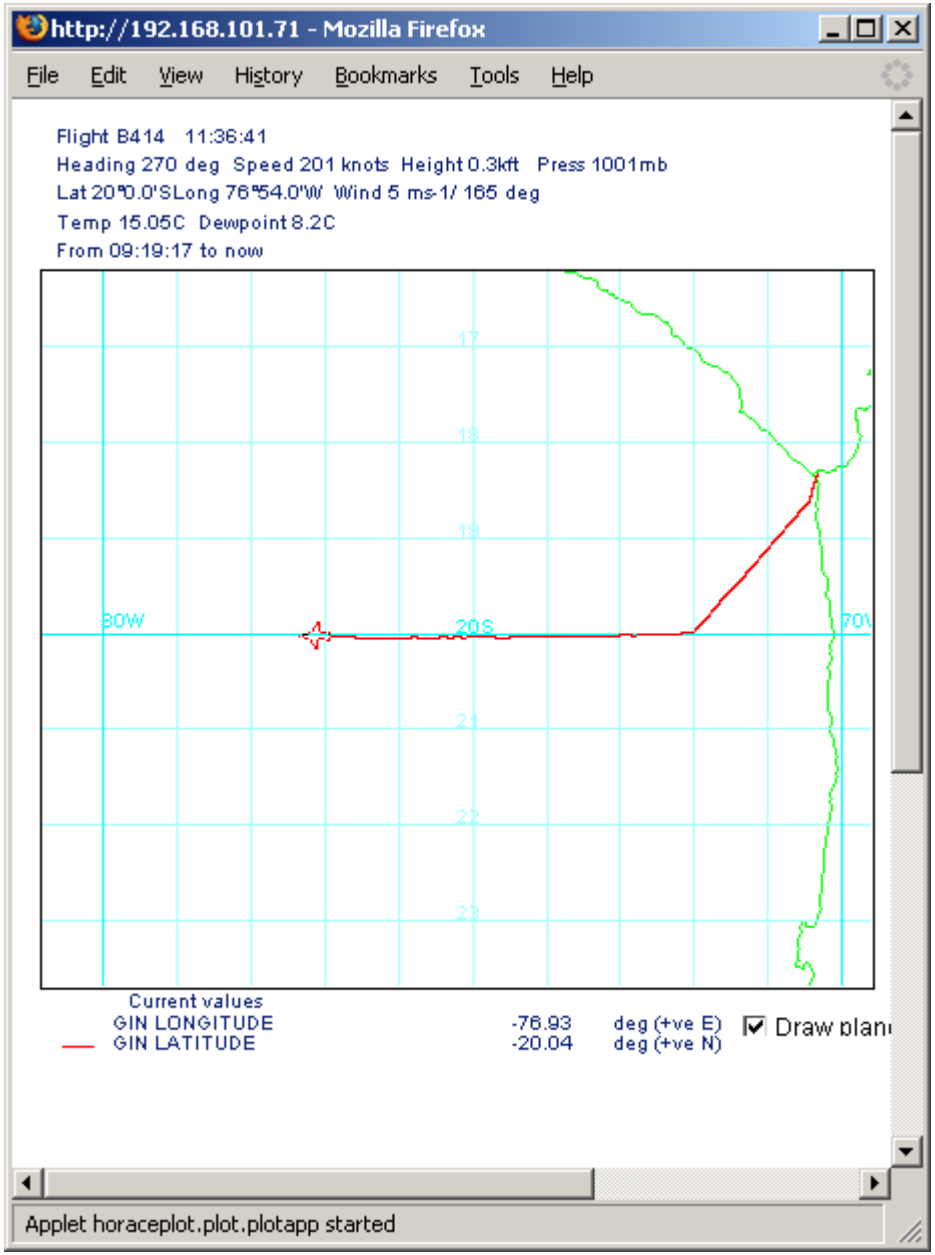

http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 11:31:25
Heading 270 deg Speed 223 knots Height 3.4kft Press 894mb
Lat 20°0.0'S Long 76°30.0'W Wind 6 ms-1/ 187 deg
Temp 5.66C Dewpoint 6.53C
From 09:19:17 to now
30W
20S
Current values
GIN LONGITUDE -76.6 deg (+ve E)
GIN LATITUDE -20.04 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
New plot, same times
Flight B414 11:35:30
Heading 266 deg Speed 205 knots Height 0.0kft Press 1009mb
Lat 20°0.0'S Long 76°48.0'W Wind 6 ms-1/ 164 deg
Temp 15.64C Dewpoint 8.92C
From start to now
0.7
0.6
0.5
0.4
0.3
g m-3
0.2
0.1
0.0
-0.1
10:15:00
10:30:00
10:45:00
11:00:00
11:15:00
secs
Current values
TIME FROM MIDNIGHT 41730 secs
JW LIQUID WATER CONTENT -0 g m-3
NEVZOROV LIQUID WATER 0 g m-3
All
Applet horaceplot.plot.plotapp started

CB on P11



End P11 at 50ft start P12



End P12 start R4.1 at 500ft

DMT Particle Analysis and Display System

Program Configure

Sampling | Recording | Read a File

Display Range: All

00 d 11:39:08

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

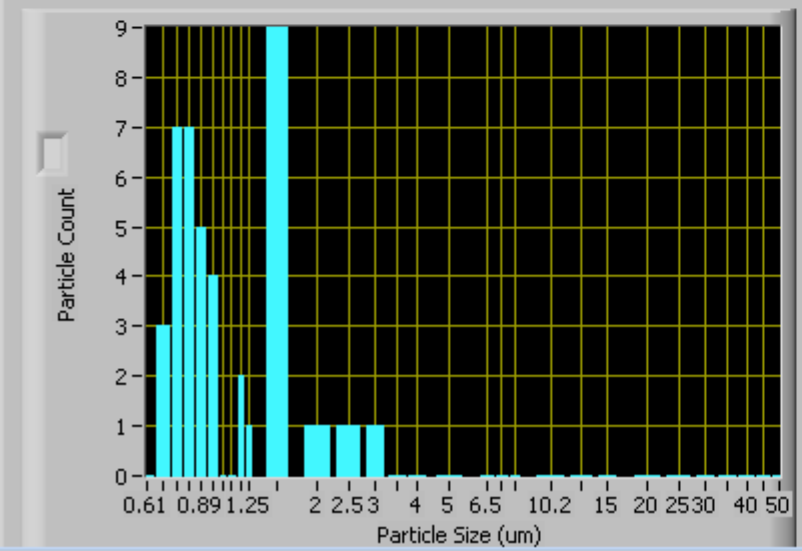
Enable: Enabled

COM Port: 4 | No Fault | v2.5.3

CAS Data | CAS Housekeeping

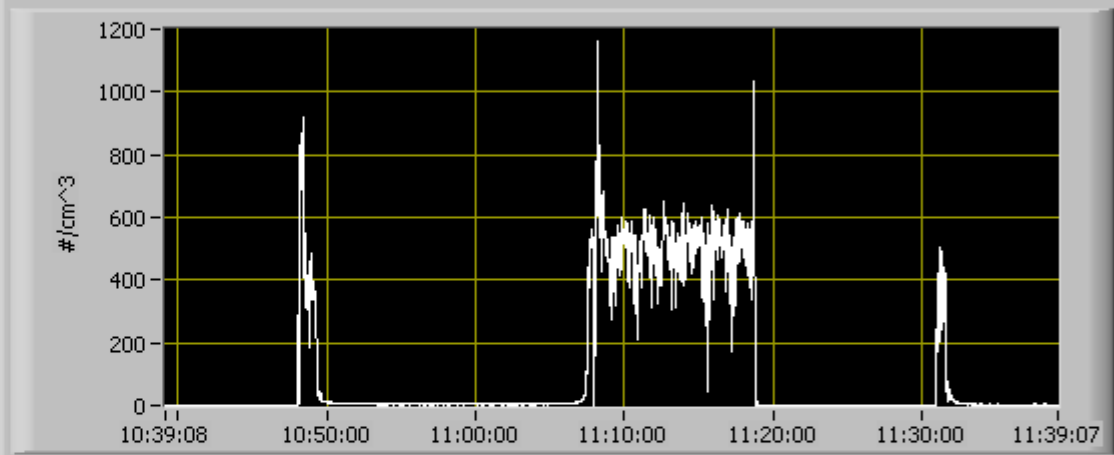
#Conc (#/cm^3): 1.77	Sum of Particles: 973	LWC Hotwire (V): 1.09
CAS LWC (g/m^3): 0	Forward Overflow: 0	LWC Slave Mon (V): 0.32
CAS MVD (um): 1.48	Backward Overflow: 0	Laser Curr Mon (mA): 87.6
CAS ED(um): 1.49	Ambient Temp (C): NaN	Laser Pwr Mon (V): 43
Dynamic Pressure: 0	Static Pressure: 0	Airspeed (m/s): 92.5

Forward Scattering | Backward Scattering

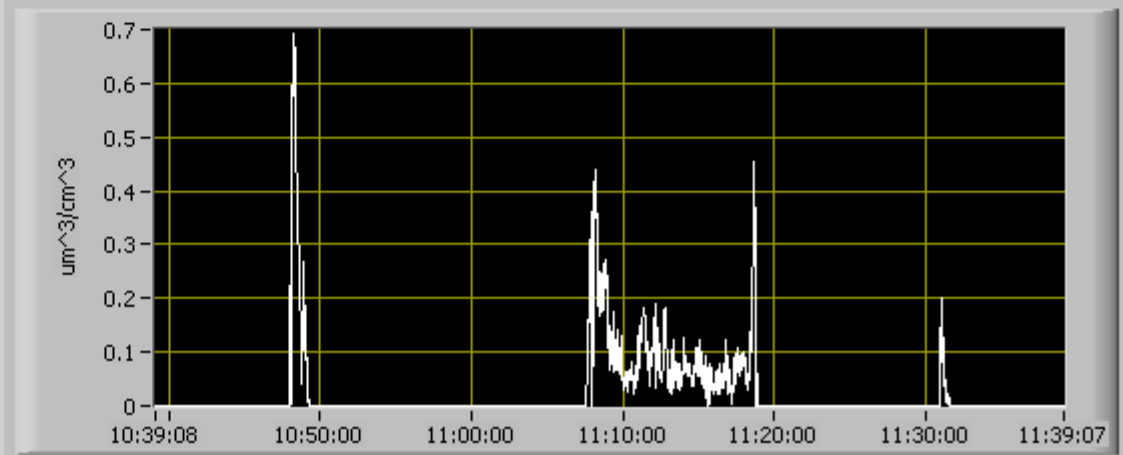


Standard Charts | Selectable Charts | Forward/Backscatter

CAS # Conc



CAS Volume Conc



DMT Particle Analysis and Display System

Program Configure

Sampling Recording Read a File

Display Range All

00 d 11:41:01

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

CIP GS Data | CIP GS Housekeeping | CIP GS Cal

Enable

Enabled

COM Port 3

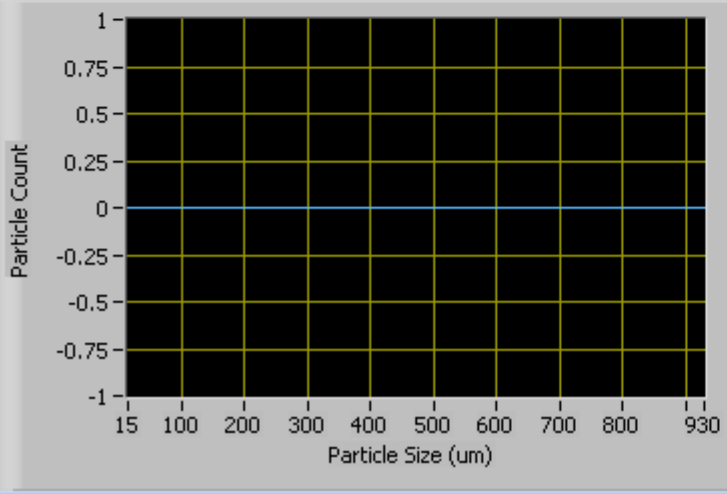
No Fault

v2.6.5

CIP GS # Conc/LWC | CIP GS Realtime Images | CIP GS Selectable Charts | Full Hist. | Diode Voltages

Numb Conc (cts/cm^3) 0		Oversize Reject Count 0
LWC (g/cm^3) 0		DOF Reject Count 0
MVD (um) 0		End Reject Count 0
ED (um) 0		Particle Counter 0
Diode 1 V 2.4	Diode 32 V 2.47	Diode 64 V 2.62

CIP Grayscale Particle Counter



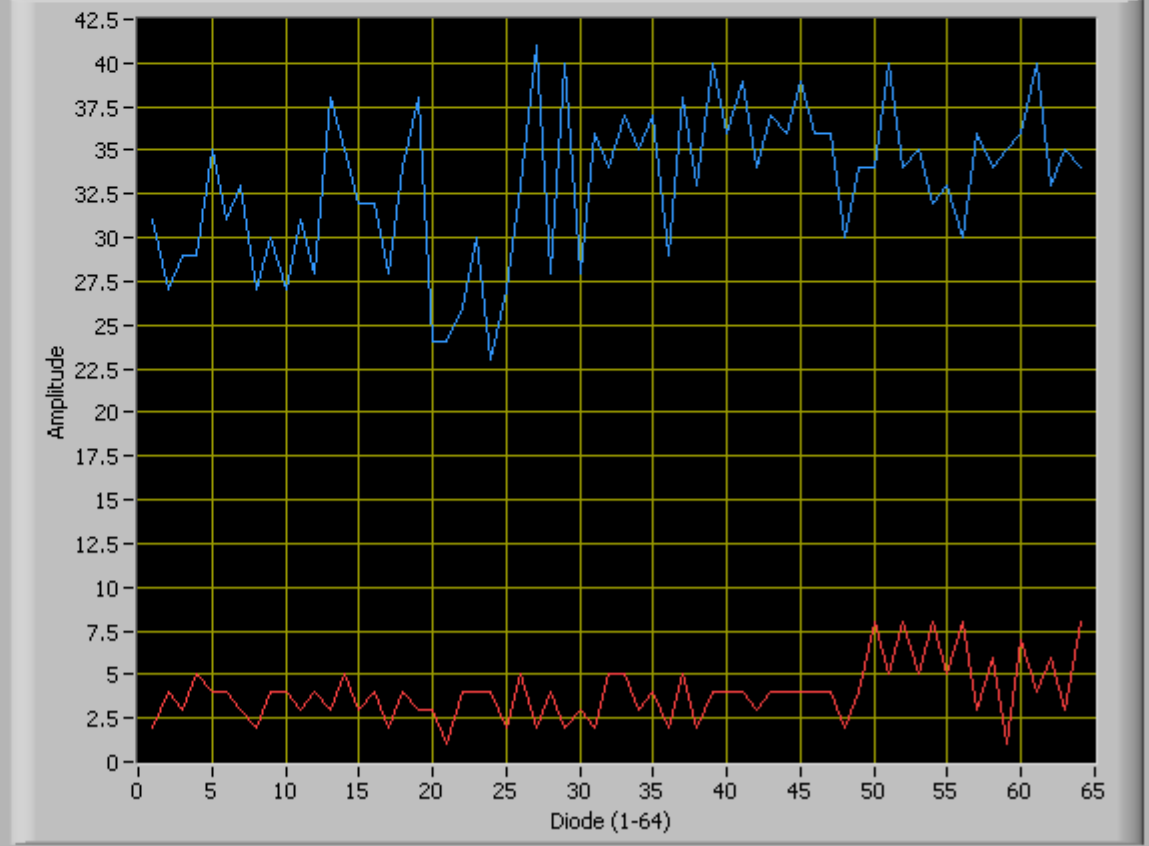
Y-axis Autoscale

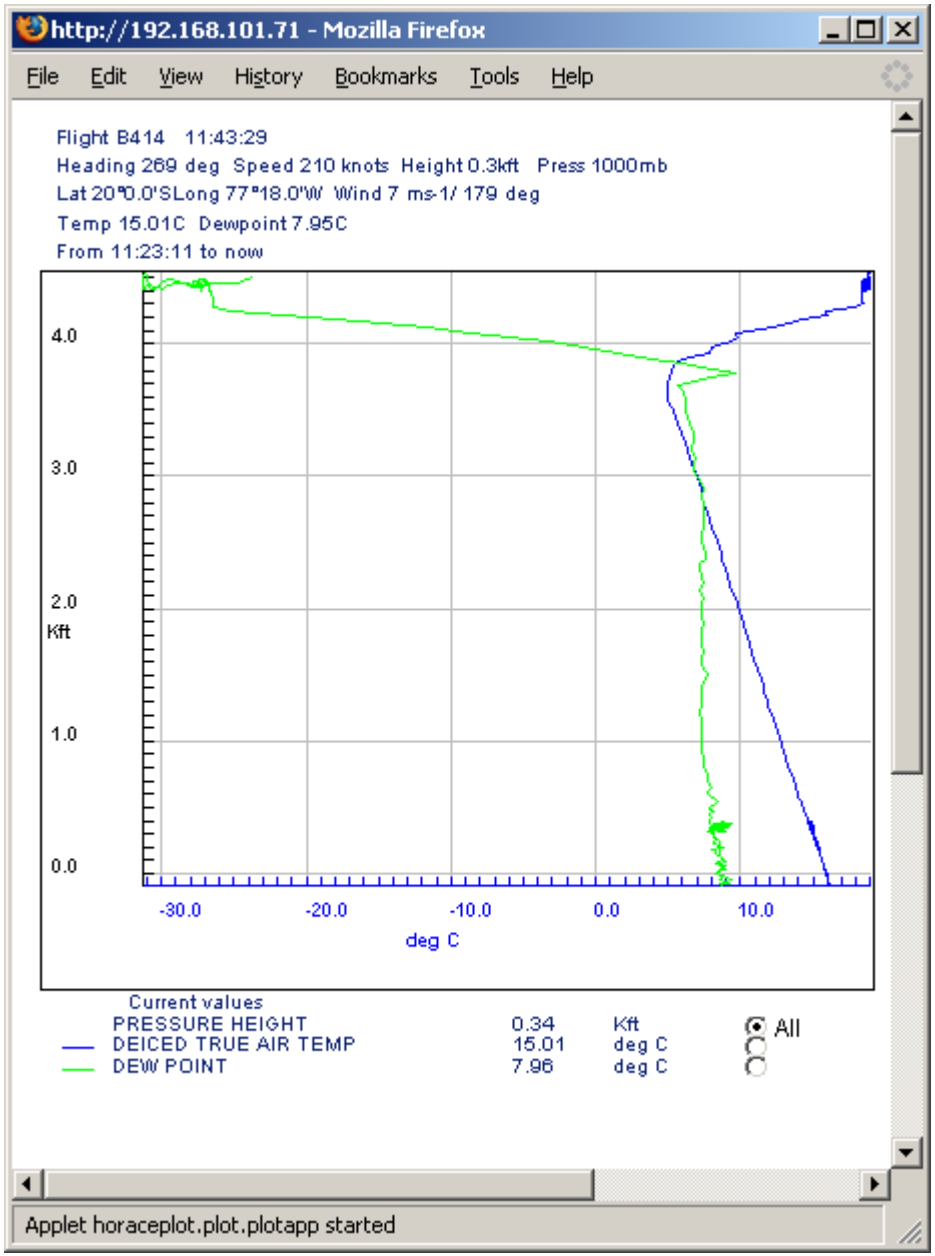
X-axis Autoscale

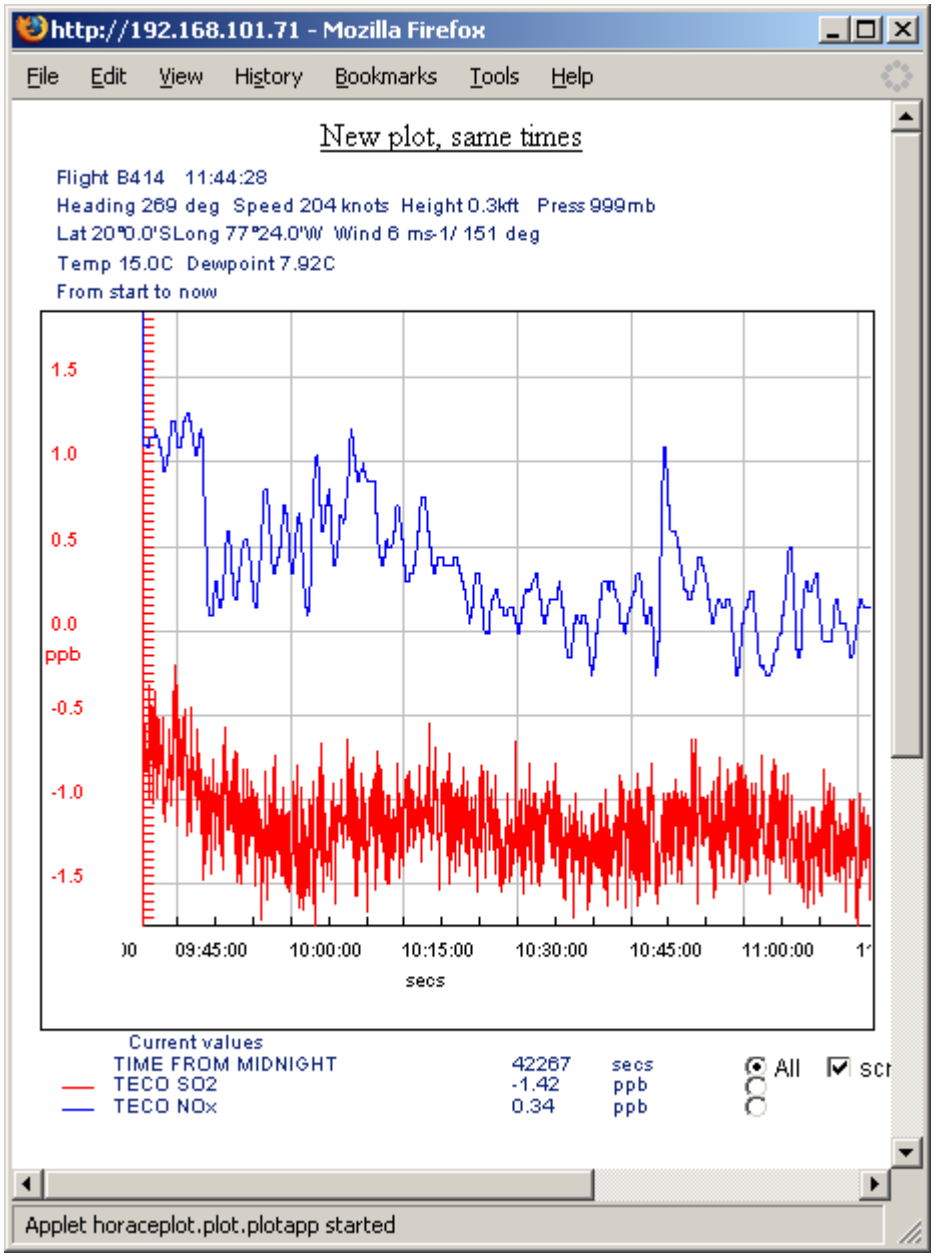
Fully Illuminated

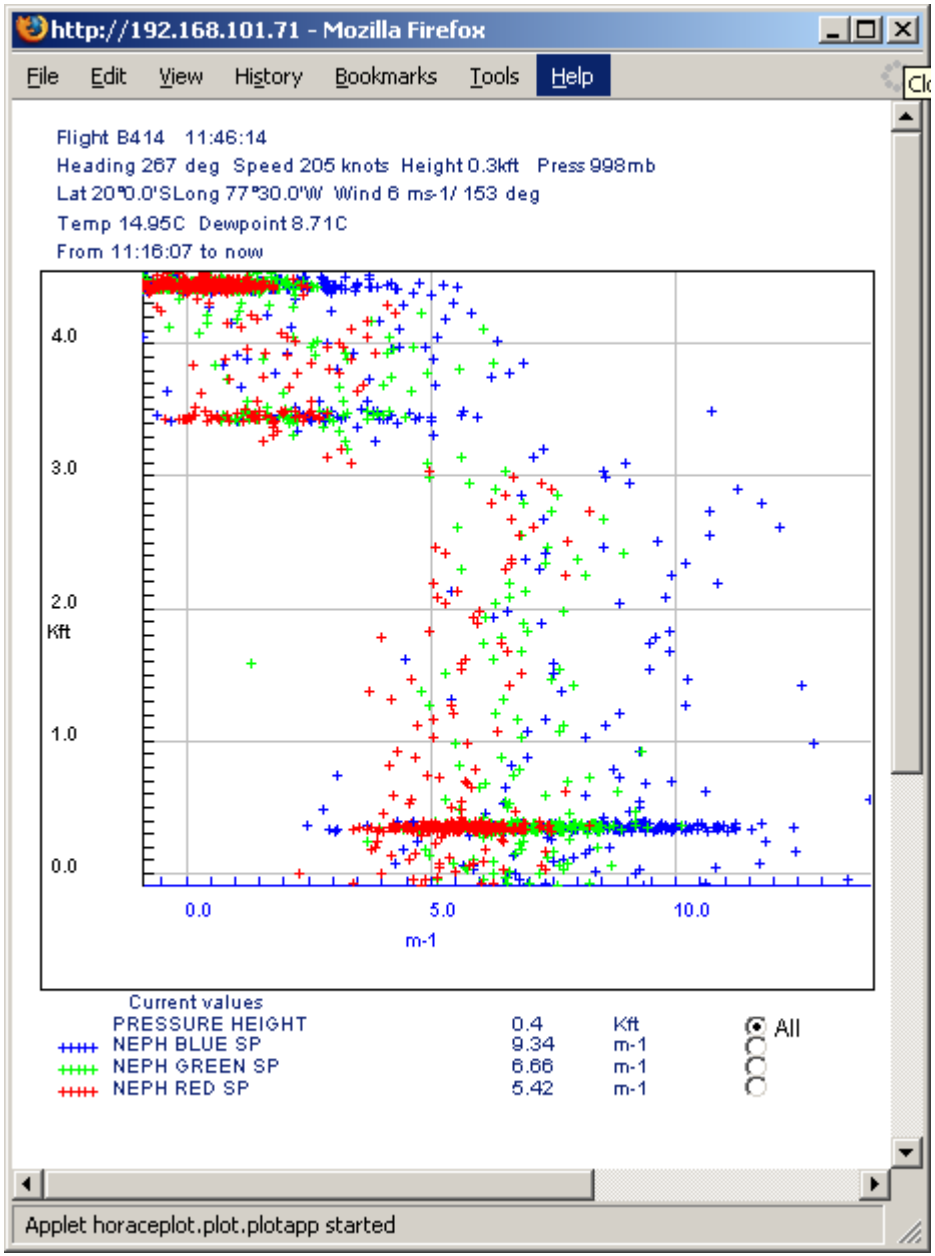
Dark Current

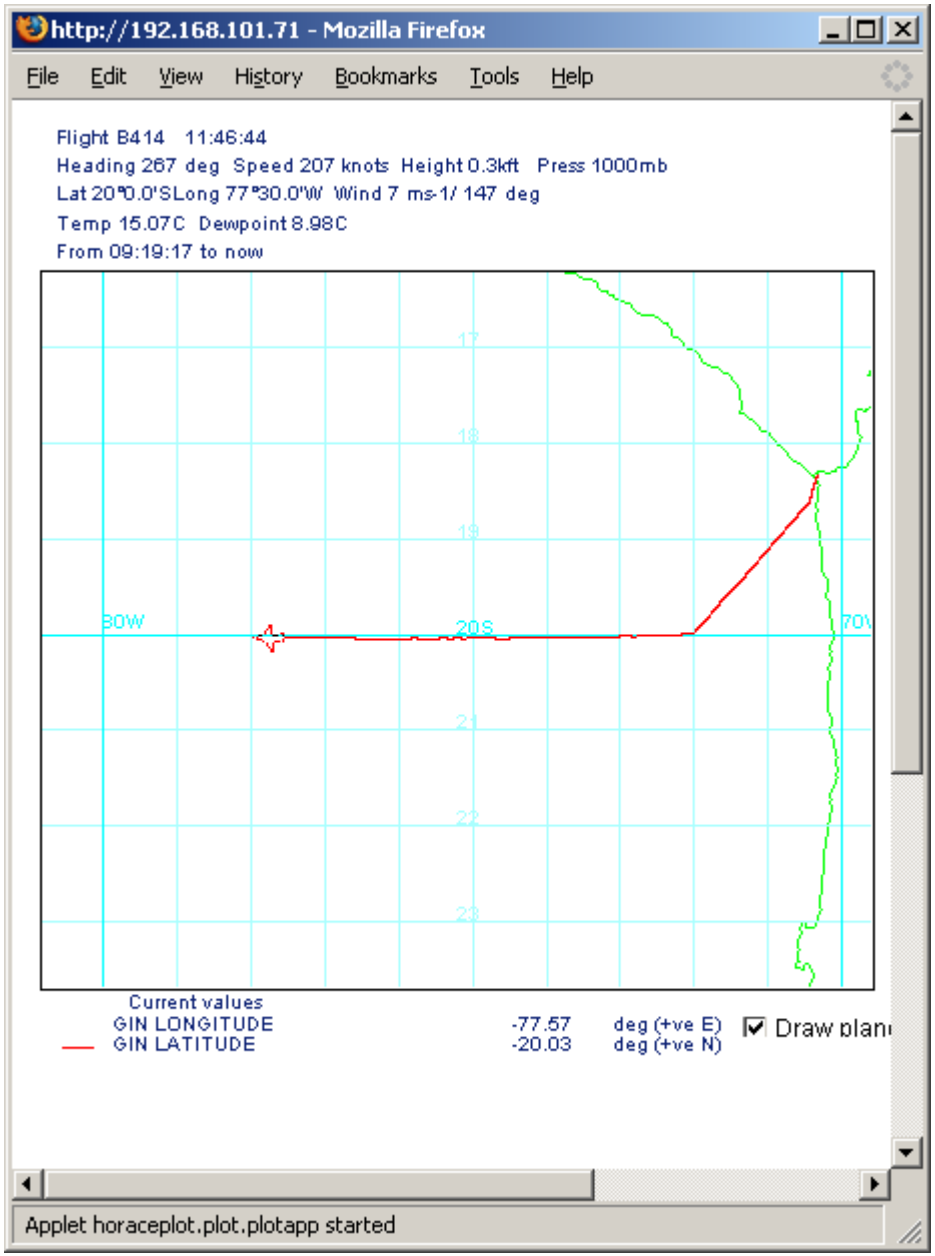
Diode Voltages



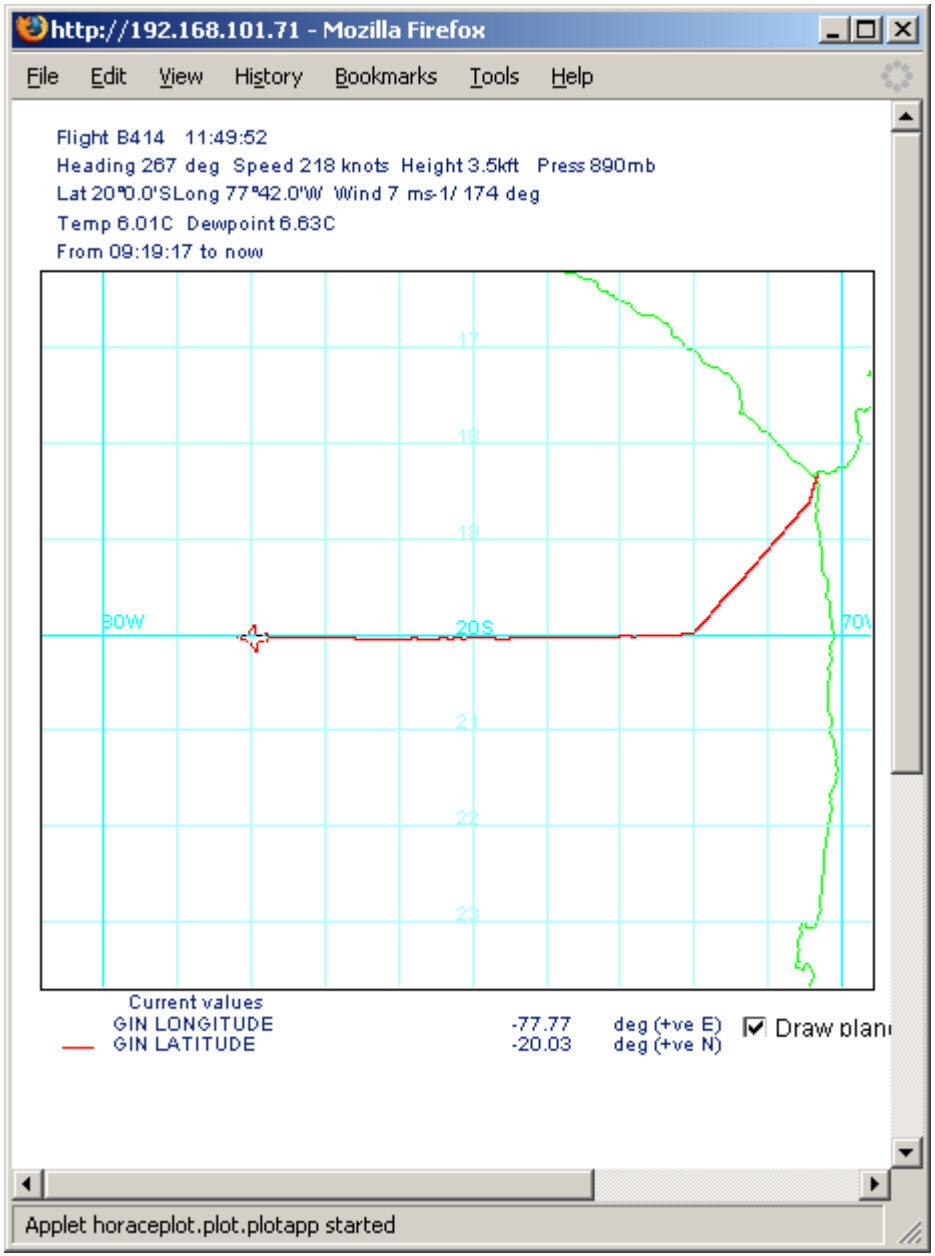

http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 11:43:29
Heading 269 deg Speed 210 knots Height 0.3kft Press 1000mb
Lat 20°0.0'S Long 77°18.0'W Wind 7 ms-1/ 179 deg
Temp 15.01C Dewpoint 7.95C
From 11:23:11 to now
4.0
3.0
2.0
Kft
1.0
0.0
-30.0
-20.0
-10.0
0.0
10.0
deg C
Current values
PRESSURE HEIGHT 0.34 Kft
DEICED TRUE AIR TEMP 15.01 deg C
DEW POINT 7.96 deg C
All
Applet horaceplot.plot.plotapp started


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
New plot, same times
Flight B414 11:44:28
Heading 269 deg Speed 204 knots Height 0.3kft Press 999mb
Lat 20°0.0'S Long 77°24.0'W Wind 6 ms-1/ 151 deg
Temp 15.0C Dewpoint 7.92C
From start to now
1.5
1.0
0.5
0.0
ppb
-0.5
-1.0
-1.5
09:45:00
10:00:00
10:15:00
10:30:00
10:45:00
11:00:00
secs
Current values
TIME FROM MIDNIGHT 42267 secs
TECO SO2 -1.42 ppb
TECO NOx 0.34 ppb
All
Applet horaceplot.plot.plotapp started

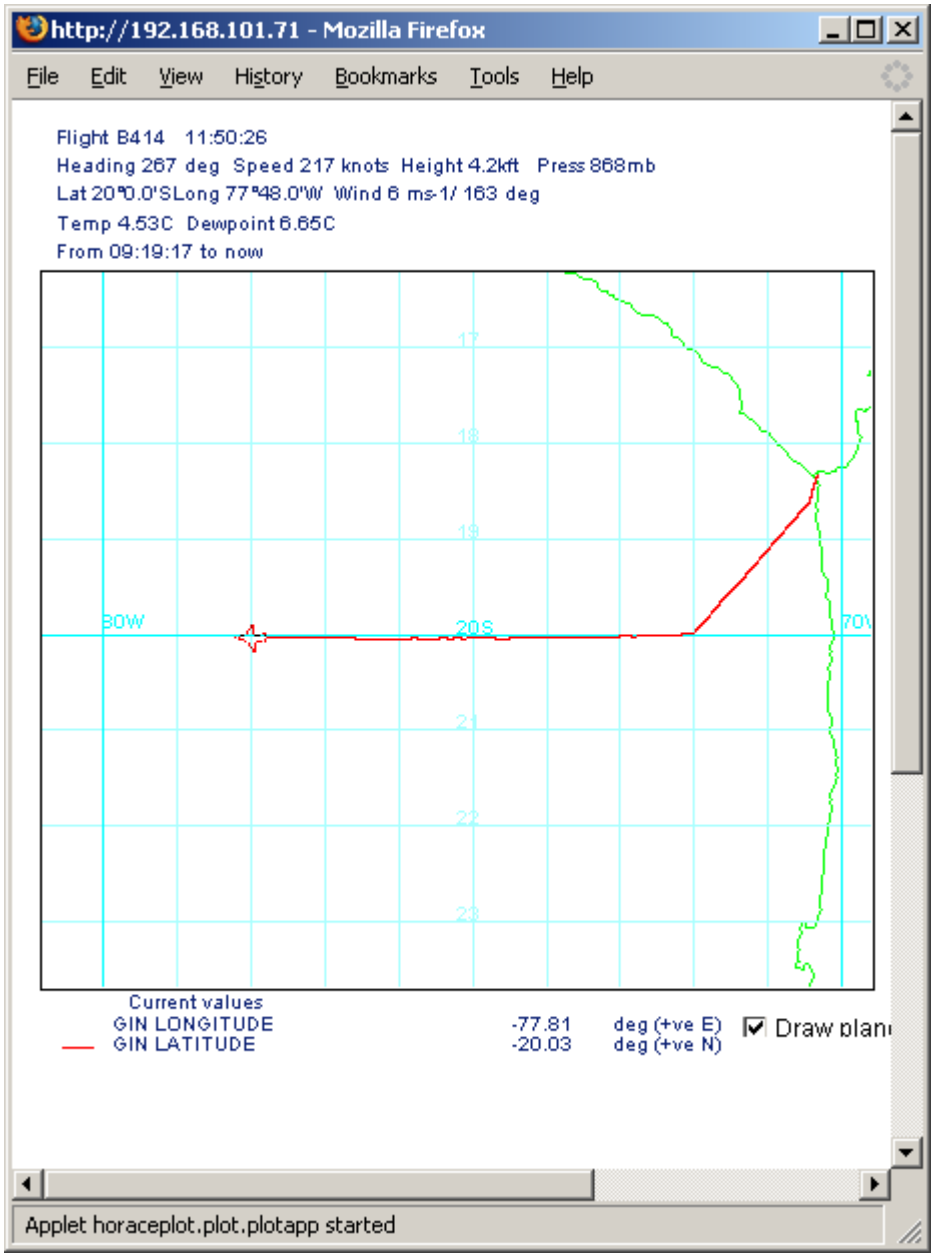




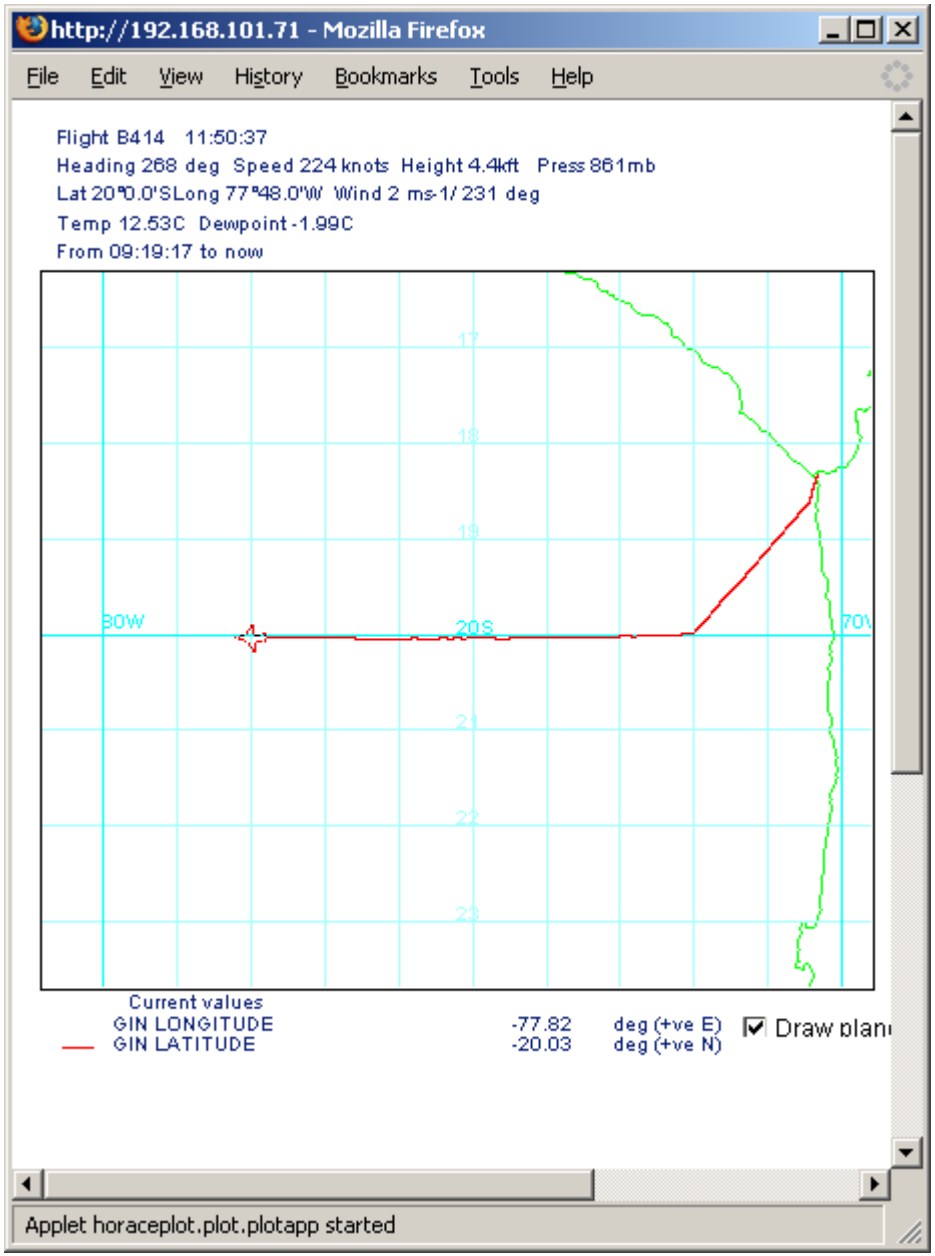
End R4.1 at 500ft P13 start


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 11:49:52
Heading 267 deg Speed 218 knots Height 3.5kft Press 890mb
Lat 20°0.0'S Long 77°42.0'W Wind 7 ms-1/ 174 deg
Temp 6.01C Dewpoint 6.63C
From 09:19:17 to now
17
18
19
80W
20S
70W
21
22
23
Current values
GIN LONGITUDE -77.77 deg (+ve E)
GIN LATITUDE -20.03 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

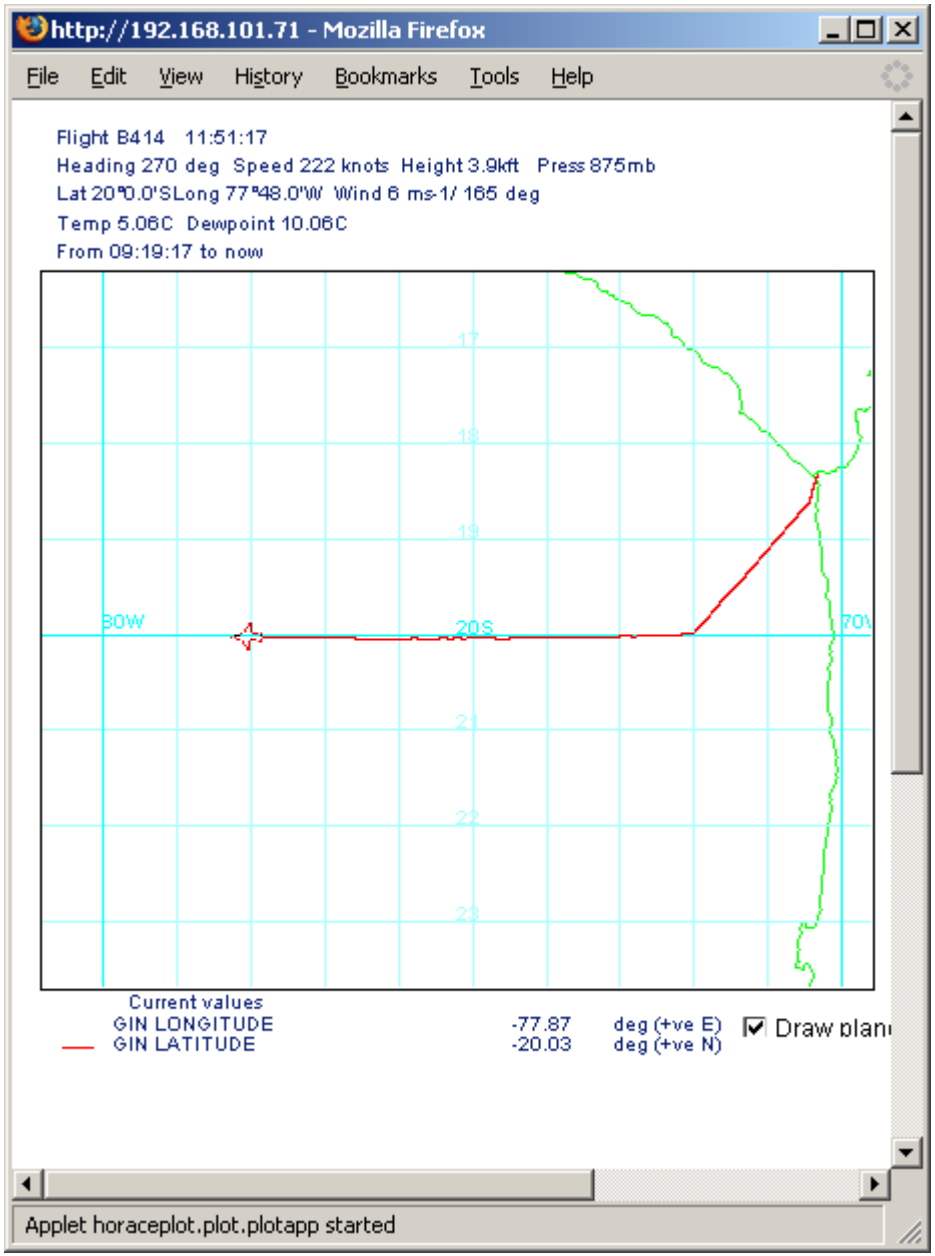
CB P13


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 11:50:26
Heading 267 deg Speed 217 knots Height 4.2kft Press 868mb
Lat 20°0.0'S Long 77°48.0'W Wind 6 ms-1/ 163 deg
Temp 4.53C Dewpoint 6.65C
From 09:19:17 to now
17
18
19
80W
20S
70W
21
22
23
Current values
GIN LONGITUDE -77.81 deg (+ve E)
GIN LATITUDE -20.03 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

CT P13



End P13 start descent into cloud



End descent, start R4.2 in cloud at

DMT Particle Analysis and Display System

Program Configure

Sampling | Recording | Read a File

Display Range: All

00 d 11:56:43

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

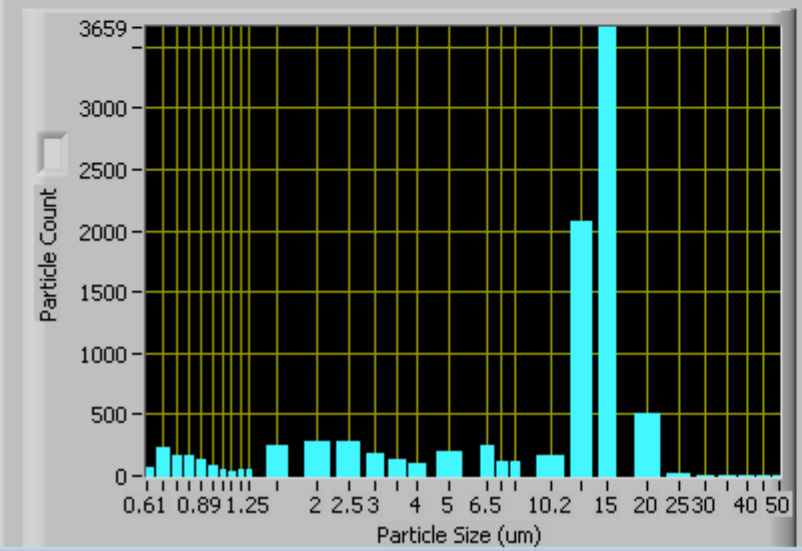
Enable: Enabled

COM Port: 4 — No Fault — v2.5.3

CAS Data | CAS Housekeeping

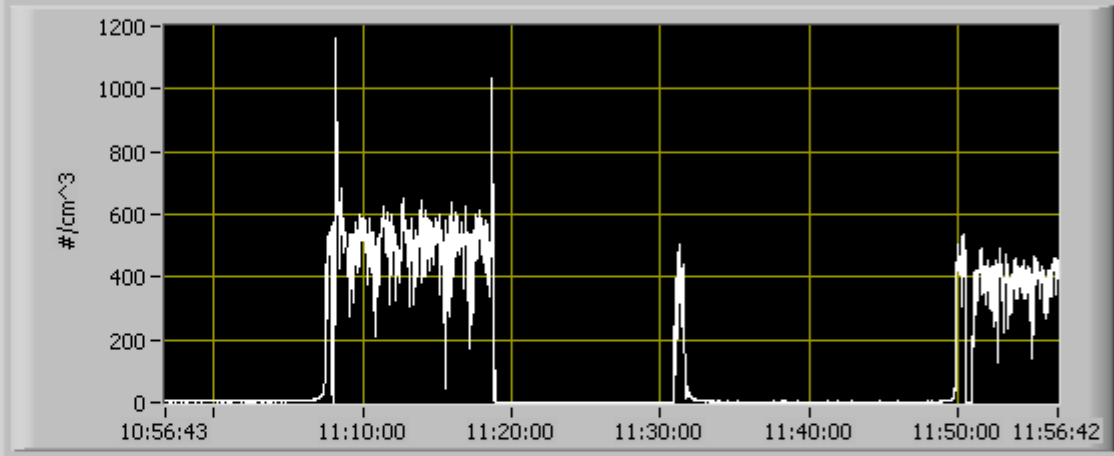
#Conc (#/cm^3): 398.09	Sum of Particles: 41365	LWC Hotwire (V): 1.32
CAS LWC (g/m^3): 0.35	Forward Overflow: 1	LWC Slave Mon (V): 0.32
CAS MVD (um): 13.7	Backward Overflow: 0	Laser Curr Mon (mA): 87.6
CAS ED(um): 13.55	Ambient Temp (C): NaN	Laser Pwr Mon (V): 43
Dynamic Pressure: 0	Static Pressure: 0	Airspeed (m/s): 93.3

Forward Scattering | Backward Scattering

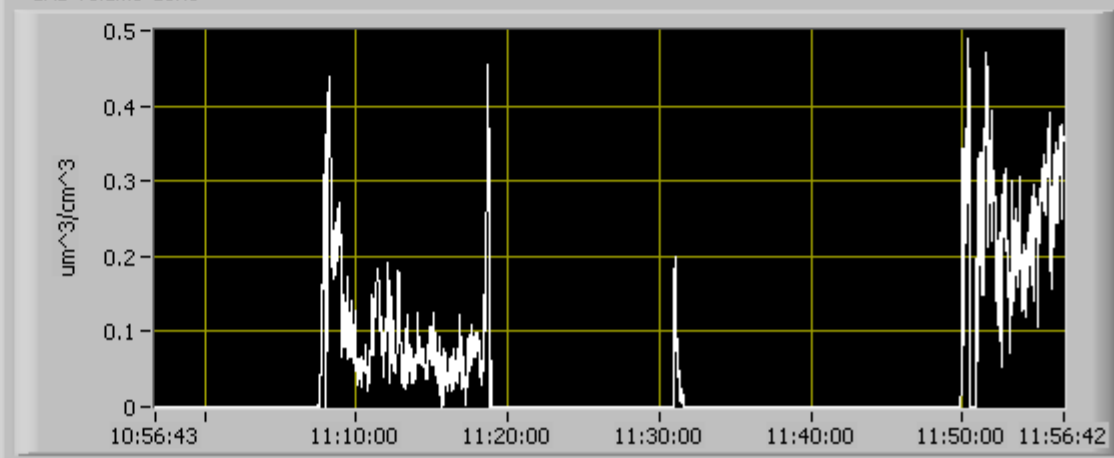


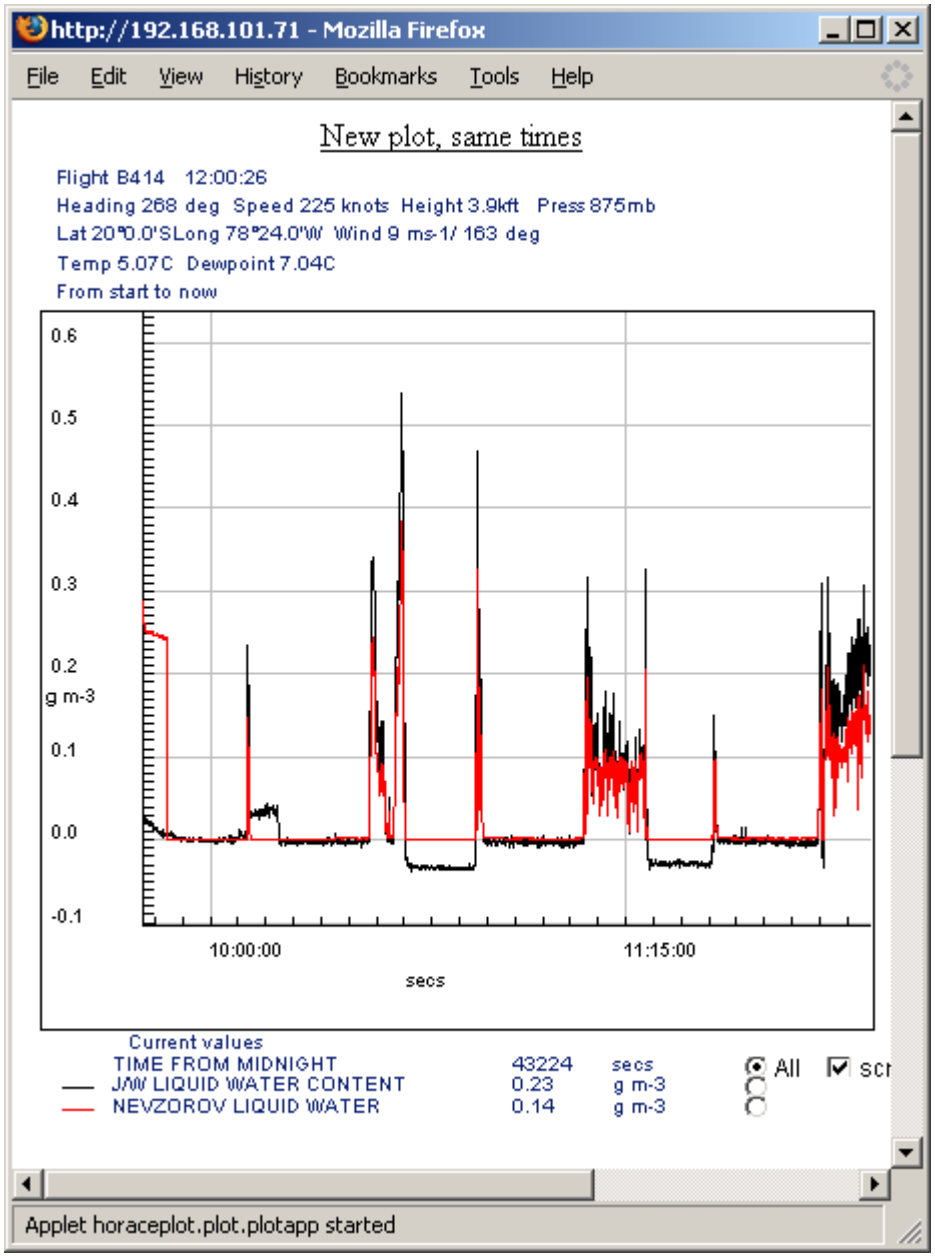
Standard Charts | Selectable Charts | Forward/Backscatter

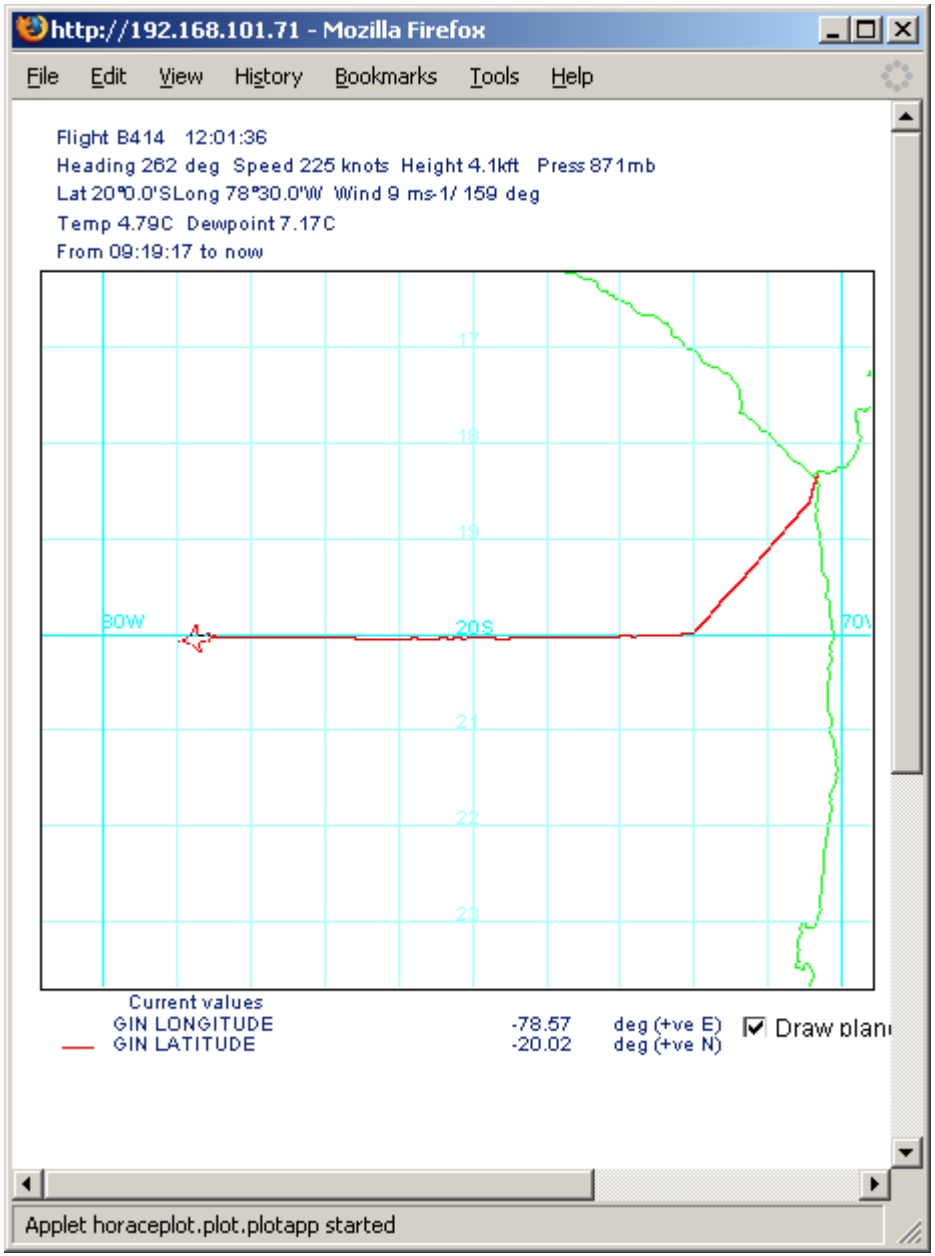
CAS # Conc



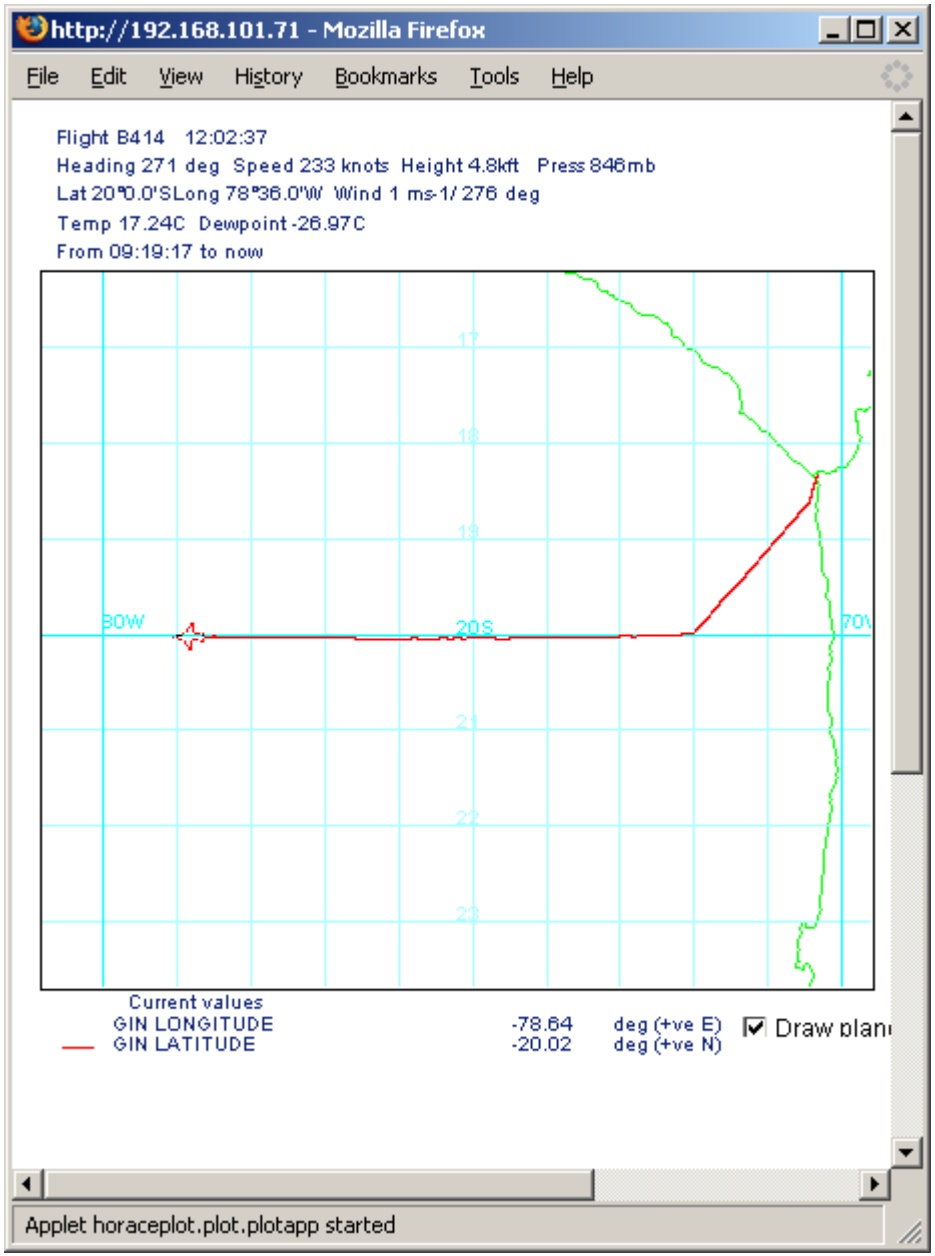
CAS Volume Conc



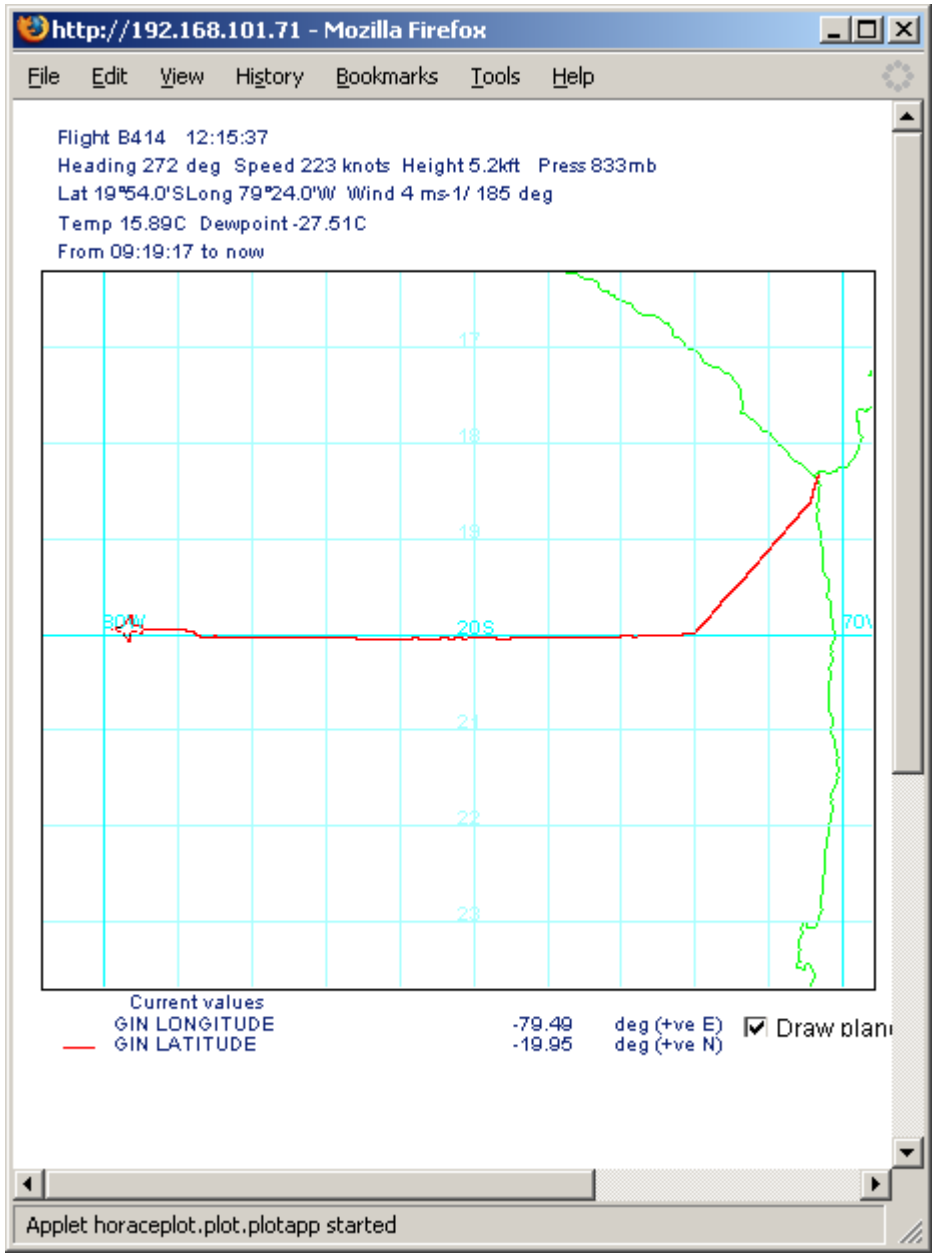




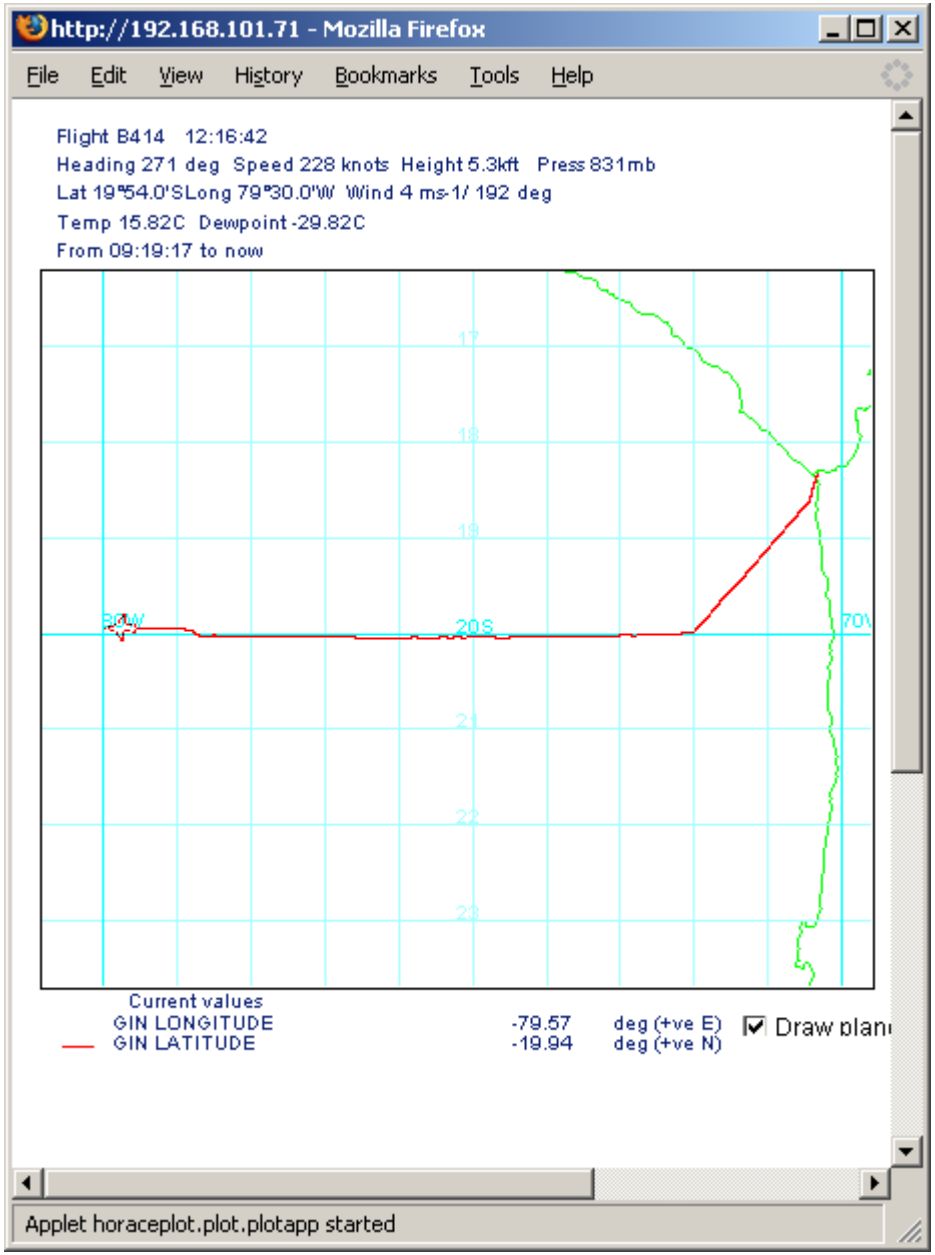
End of R4.2 (late).... CT 4400ft

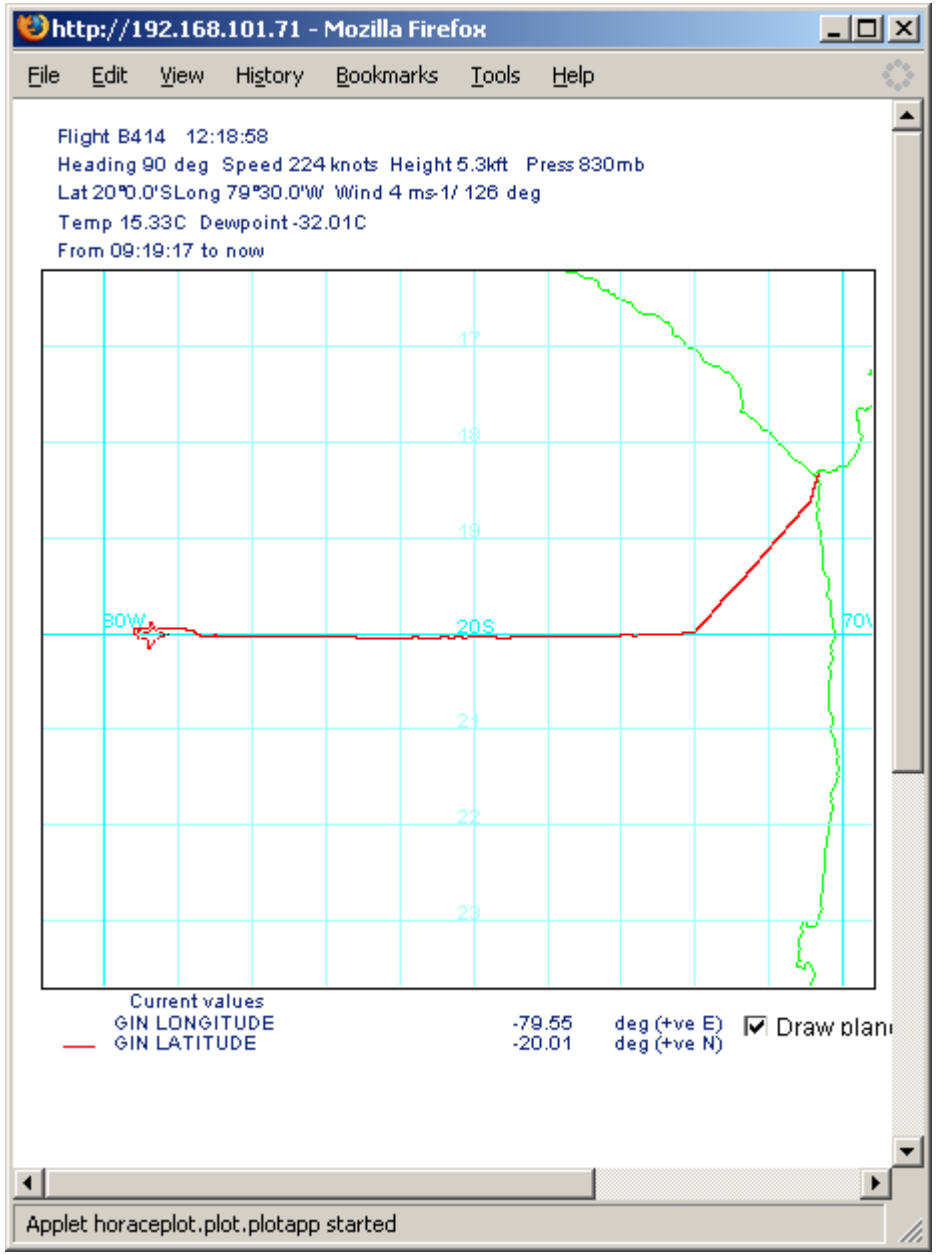


End P14 start 4.3 above CT



End of P15 start of R5.1





Turning

Turn completed – crossed C130 contrail few secs ago

Flight Summary B414

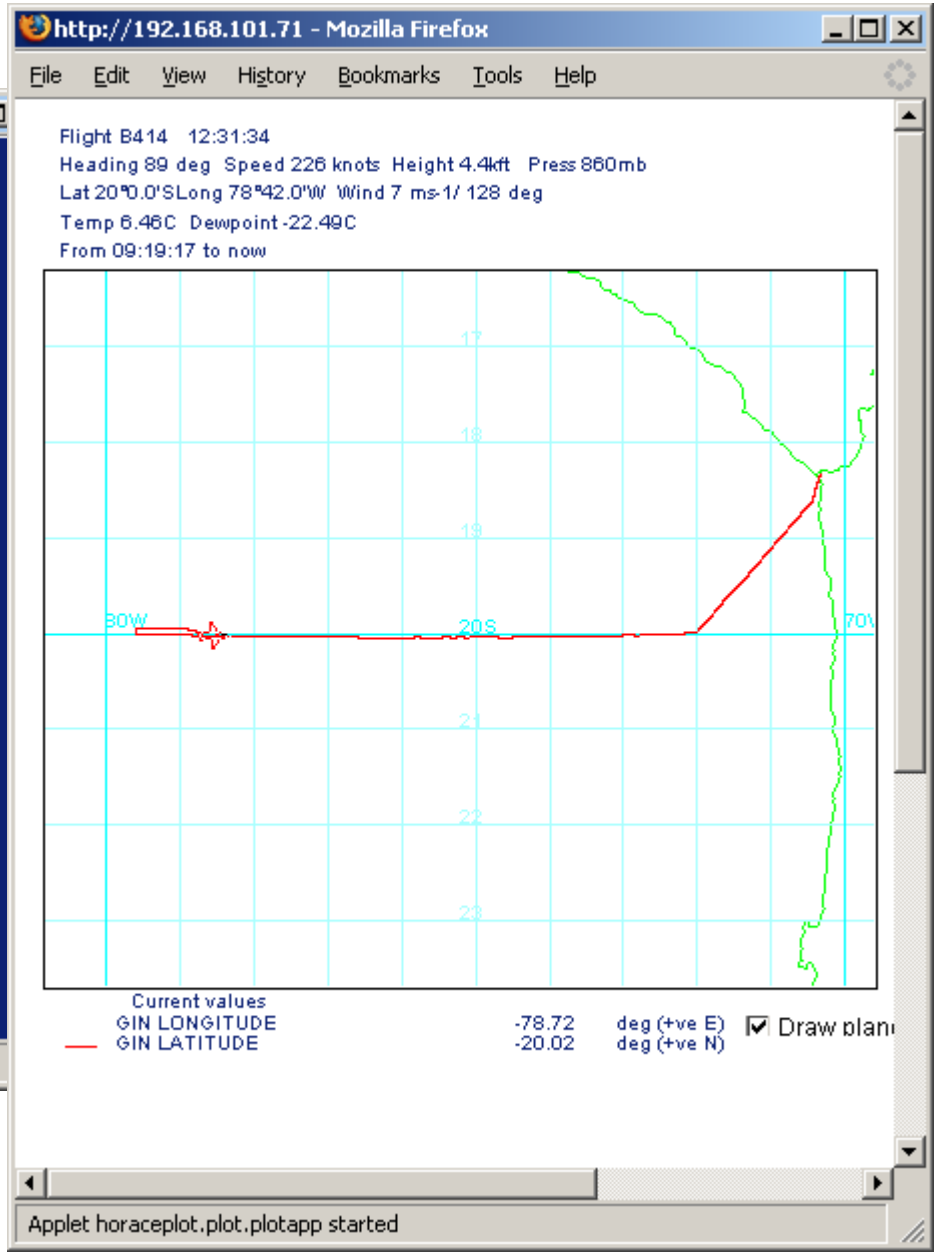
Event	Start	Hdg	Hgt	Lat	Long	Stop	Hdg	Hgt	Lat	Long	Comment
gin	09:18:04	023	0.08kft	18.4S	70.3W						on
ASP	09:38:52	314	0.08kft	18.3S	70.3W						open
T/O	09:44:48	199	0.05kft	18.4S	70.3W						Arica
Profile 1	09:45:14	201	0.40kft	18.4S	70.3W	09:51:21	223	6.0kft	18.7S	70.5W	start as t/o 6000ft
Run 1	09:51:50	220	6.0kft	18.7S	70.6W	10:03:34	227	6.0kft	19.3S	71.2W	start as end P1
nev	09:52:22	221	6.0kft	18.7S	70.6W						zero
JW	09:53:40	227	6.0kft	18.8S	70.7W						zero
heimann	09:55:12	225	6.0kft	18.9S	70.7W						cal 09
Profile 2	10:03:34	227	6.0kft	19.3S	71.2W	10:10:28	229	-.05kft	19.6S	71.5W	50ft qnh1017
!	10:06:37	227	3.0kft	19.4S	71.3W						cloud top
!	10:06:51	225	2.8kft	19.4S	71.3W						at 3100ft
!	10:07:25	230	2.2kft	19.4S	71.4W						cloud base 2400
Profile 3	10:10:28	229	-.05kft	19.6S	71.5W	10:11:30	229	0.39kft	19.6S	71.6W	50ft qnh1017 500ft
Run 2.1	10:11:30	229	0.39kft	19.6S	71.6W	10:21:38	270	0.44kft	20.0S	72.0W	500ft
JW	10:12:42	225	0.38kft	19.6S	71.6W						zero
!	10:20:42	227	0.39kft	20.0S	72.0W						qnh 1018
Profile 4	10:21:38	270	0.44kft	20.0S	72.0W	10:22:36	268	1.4kft	20.0S	72.1W	
Run 2.2	10:22:36	268	1.4kft	20.0S	72.1W	10:27:19	267	1.4kft	20.0S	72.4W	
!	10:22:57	268	1.4kft	20.0S	72.1W						1500ft
nev	10:23:28	267	1.4kft	20.0S	72.1W						zero
JW	10:23:41	264	1.4kft	20.0S	72.2W						zero
Profile 5	10:27:20	267	1.4kft	20.0S	72.4W	10:28:50	272	2.9kft	20.0S	72.5W	
Run 2.3	10:28:50	272	2.9kft	20.0S	72.5W	10:34:16	272	2.9kft	20.0S	72.9W	
r2.3	10:29:41	266	2.9kft	20.0S	72.6W						3000ft cloud base 2700ft
Profile 6	10:34:16	272	2.9kft	20.0S	72.9W	10:36:20	269	4.8kft	20.0S	73.0W	
!	10:35:35	269	4.2kft	20.0S	73.0W						tops 3900ft
Run 2.4	10:36:20	269	4.8kft	20.0S	73.0W	10:46:50	273	4.9kft	20.0S	73.7W	
r2.4	10:36:54	268	4.9kft	20.0S	73.1W						5000ft
Profile 7	10:46:50	273	4.9kft	20.0S	73.7W	10:53:45	273	-.08kft	20.0S	74.2W	50 ft qnh1019
Profile 8	10:53:46	273	-.08kft	20.0S	74.2W	10:54:36	269	0.38kft	20.0S	74.2W	50 ft qnh1019

http://192.168.101.71:1500 - Mozilla Firefox

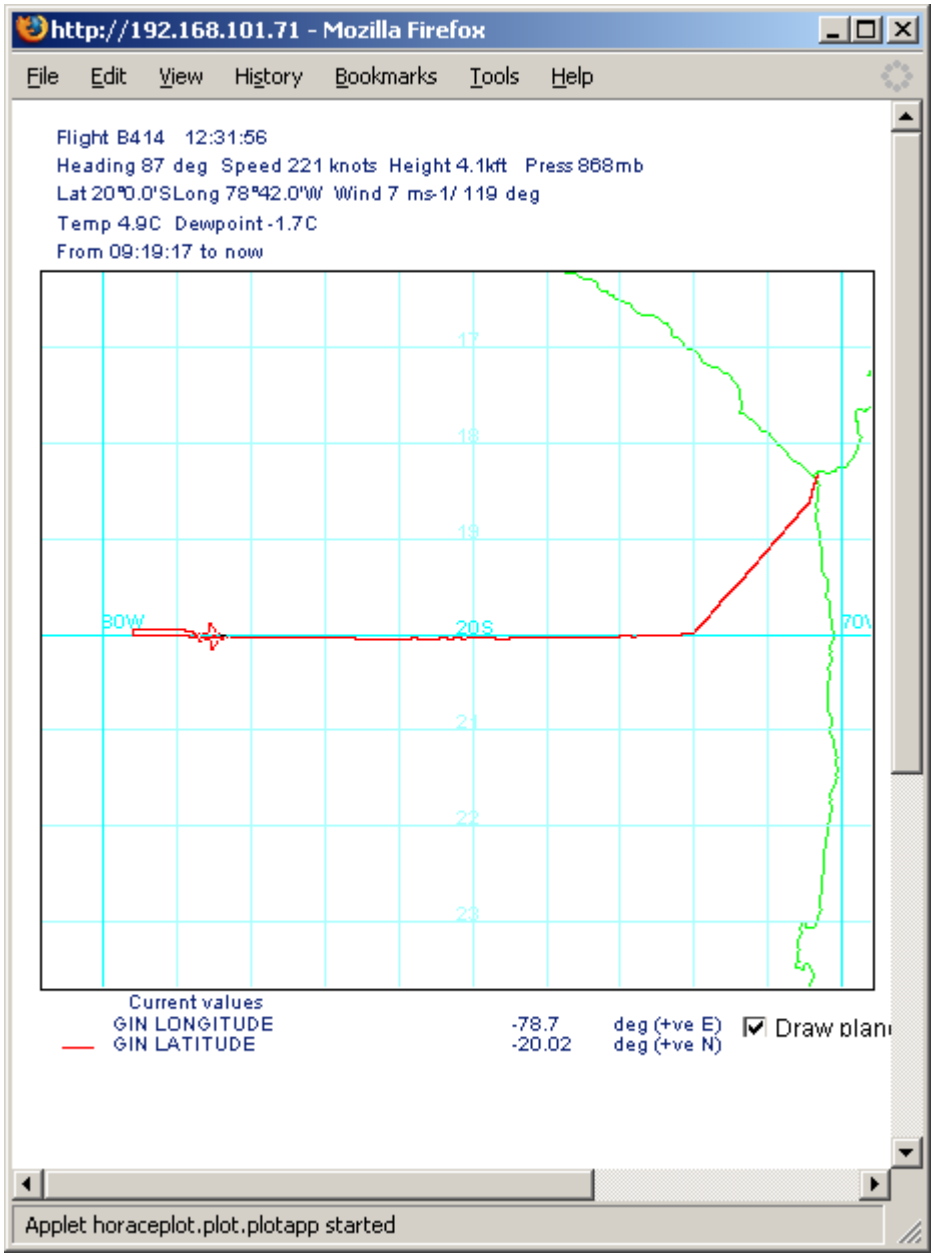
Horace Index | http://192.168....1:1500/#bottom

Run 2.3	10:28:50	272	2.9kft	20.0S	72.5W	10:34:16	272	2.9kft	20.0S	72.9W	
r2.3	10:29:41	266	2.9kft	20.0S	72.6W						3000ft cloud base 2700ft
Profile 6	10:34:16	272	2.9kft	20.0S	72.9W	10:36:20	269	4.8kft	20.0S	73.0W	
!	10:35:35	269	4.2kft	20.0S	73.0W						tops 3900ft
Run 2.4	10:36:20	269	4.8kft	20.0S	73.0W	10:46:50	273	4.9kft	20.0S	73.7W	
r2.4	10:36:54	268	4.9kft	20.0S	73.1W						5000ft
Profile 7	10:46:50	273	4.9kft	20.0S	73.7W	10:53:45	273	-.08kft	20.0S	74.2W	50 ft qnh1019
Profile 8	10:53:46	273	-.08kft	20.0S	74.2W	10:54:36	269	0.38kft	20.0S	74.2W	50 ft qnh1019
Run 3.1	10:54:36	269	0.38kft	20.0S	74.2W	11:04:39	269	0.36kft	20.0S	74.9W	
r3.1	10:55:13	268	0.44kft	20.0S	74.3W						500ft
Profile 9	11:04:39	269	0.36kft	20.0S	74.9W	11:07:52	265	3.6kft	20.0S	75.1W	
Run 3.2	11:07:52	265	3.6kft	20.0S	75.1W	11:18:11	273	3.4kft	20.0S	75.7W	
!	11:08:30	263	3.5kft	20.0S	75.1W						r3.2 reset to 3600ft
Profile 10	11:18:12	273	3.4kft	20.0S	75.7W	11:19:20	272	4.4kft	20.0S	75.8W	
Run 3.3	11:19:20	272	4.4kft	20.0S	75.8W	11:30:02	274	4.5kft	20.0S	76.5W	
r3.3	11:19:46	267	4.4kft	20.0S	75.8W						500ft above cloud
heimann	11:24:04	276	4.5kft	20.1S	76.1W						cal 06
Profile 11	11:30:02	274	4.5kft	20.0S	76.5W	11:35:59	267	-.08kft	20.0S	76.9W	50ft qnh 1019
Profile 12	11:36:00	267	-.10kft	20.0S	76.9W	11:36:44	270	0.33kft	20.0S	76.9W	50ft qnh 1019
Run 4.1	11:36:44	270	0.33kft	20.0S	76.9W	11:46:49	267	0.33kft	20.0S	77.6W	
heimann	11:38:18	267	0.33kft	20.0S	77.0W						cal 09
r4.1	11:38:30	266	0.33kft	20.0S	77.1W						500ft
JW	11:38:56	266	0.34kft	20.0S	77.1W						zero check
nev	11:39:10	267	0.38kft	20.0S	77.1W						zero check
Profile 13	11:46:49	267	0.33kft	20.0S	77.6W	11:51:19	271	4.0kft	20.0S	77.9W	
Run 4.2	11:51:19	271	4.0kft	20.0S	77.9W	12:01:26	264	4.0kft	20.0S	78.6W	
p13	11:52:12	269	4.0kft	20.0S	77.9W						pop up above to check cloud top
Profile 14	12:01:27	262	4.0kft	20.0S	78.6W	12:02:35	271	4.9kft	20.0S	78.6W	
Run 4.3	12:02:36	271	4.9kft	20.0S	78.6W	12:15:09	270	4.9kft	20.0S	79.5W	
Profile 15	12:15:09	270	4.9kft	20.0S	79.5W	12:16:04	273	5.4kft	19.9S	79.5W	
Run 5.1	12:16:18	274	5.4kft	19.9S	79.5W						
r5.1	12:19:16	091	5.3kft	20.0S	79.5W						C130 run start 1 mile south of C130 track

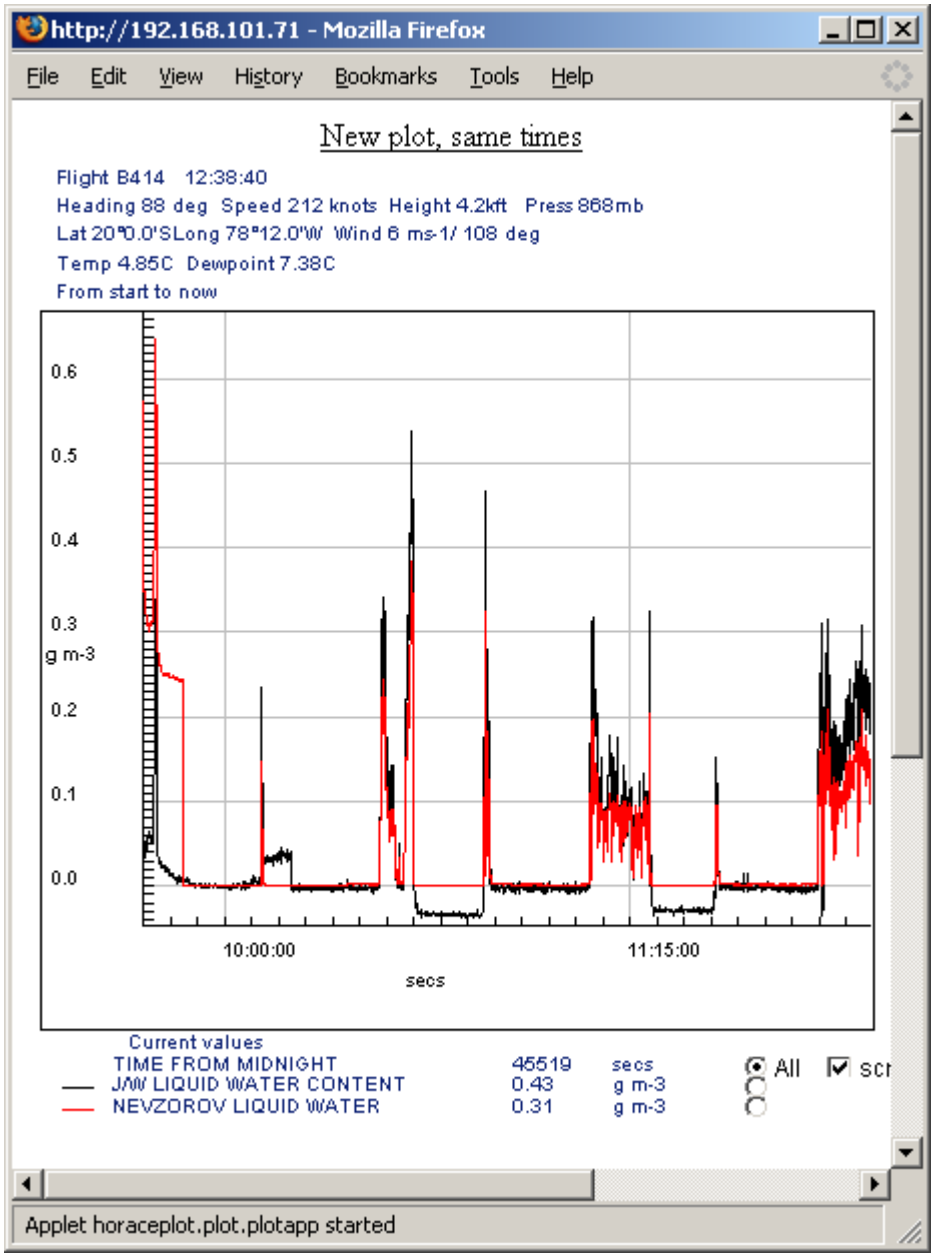
End run 5.1 P16 down



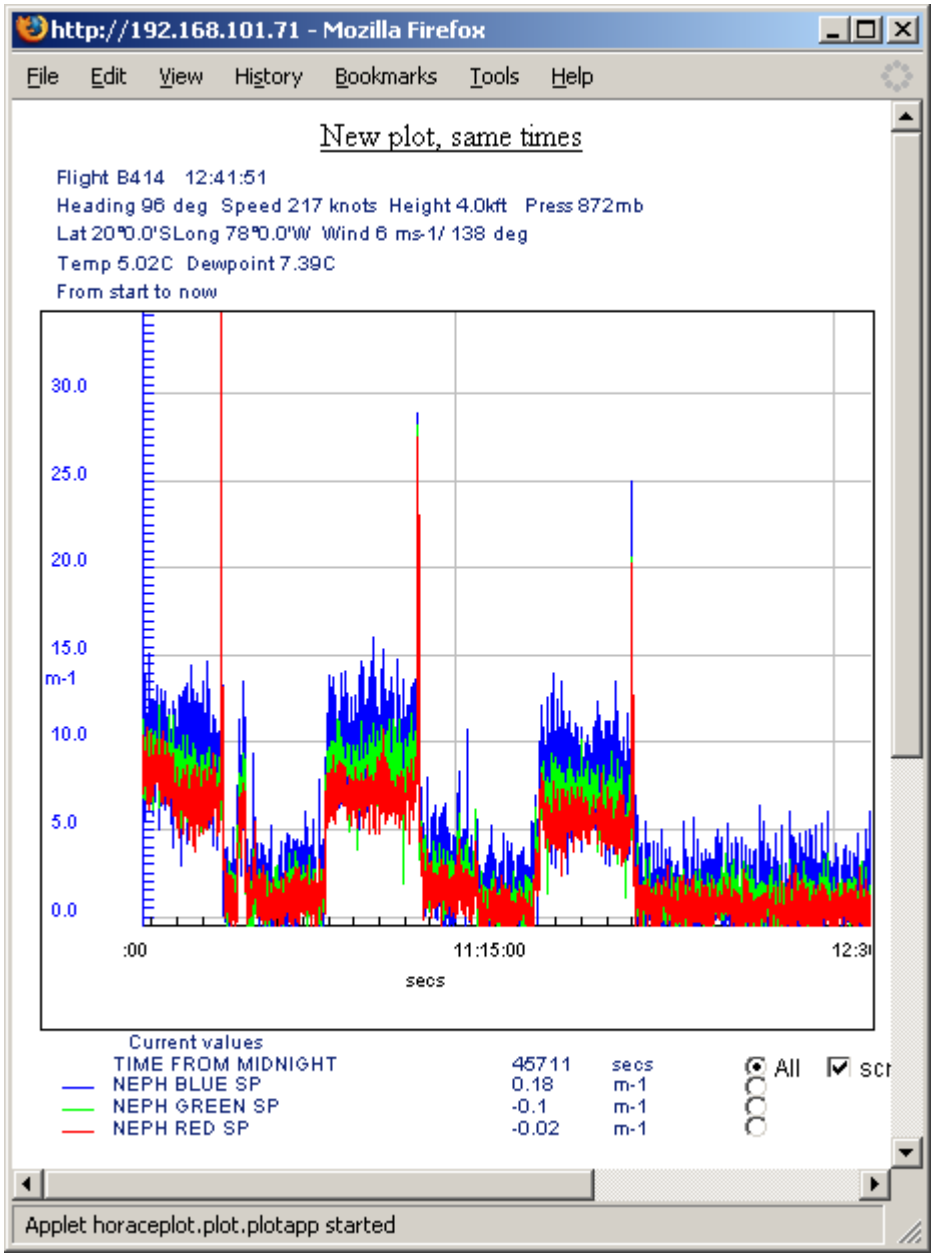
P16 CT at 4600ft (Capt)



End P16 start R5.2



R5.2 cf with CVI LA 0.1g m-3



End R5.2 start P17

P17 end R5.3 at 500ft started 124531

DMT Particle Analysis and Display System

Program Configure

Sampling | Recording | Read a File

Display Range: All

00 d 12:50:46

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

Enable: Enabled

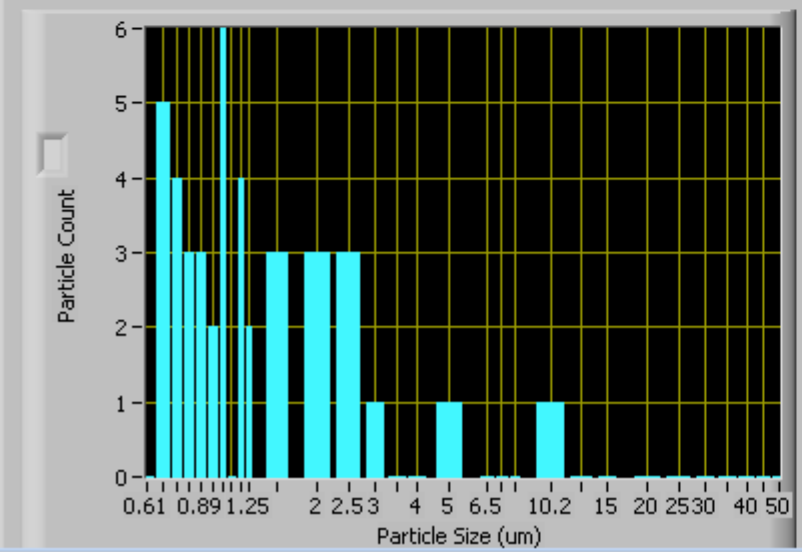
COM Port: 4 — No Fault

v2.5.3

CAS Data | CAS Housekeeping

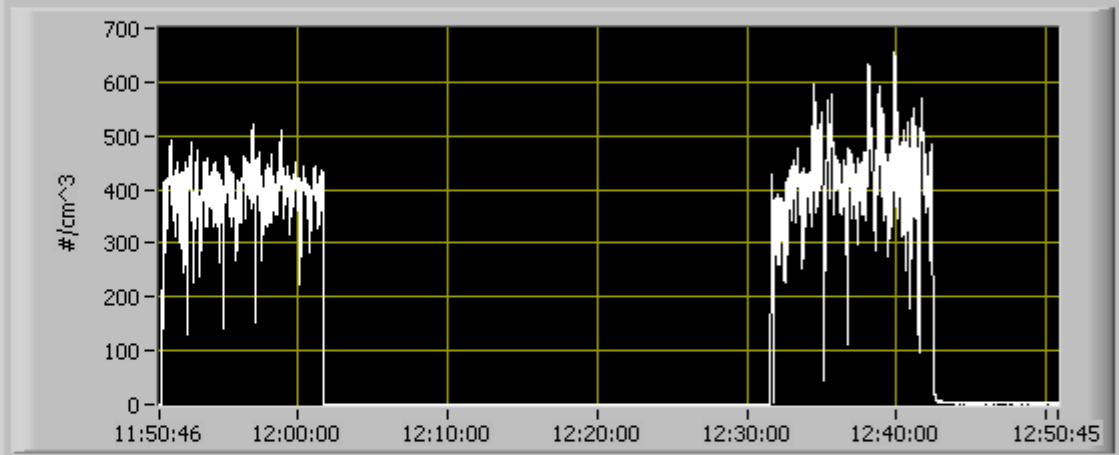
#Conc (#/cm^3): 1.85	Sum of Particles: 814	LWC Hotwire (V): 1.09
CAS LWC (g/m^3): 0	Forward Overflow: 0	LWC Slave Mon (V): 0.32
CAS MVD (um): 8.75	Backward Overflow: 0	Laser Curr Mon (mA): 87.5
CAS ED(um): 5.71	Ambient Temp (C): NaN	Laser Pwr Mon (V): 43
Dynamic Pressure: 0	Static Pressure: 0	Airspeed (m/s): 88.6

Forward Scattering | Backward Scattering

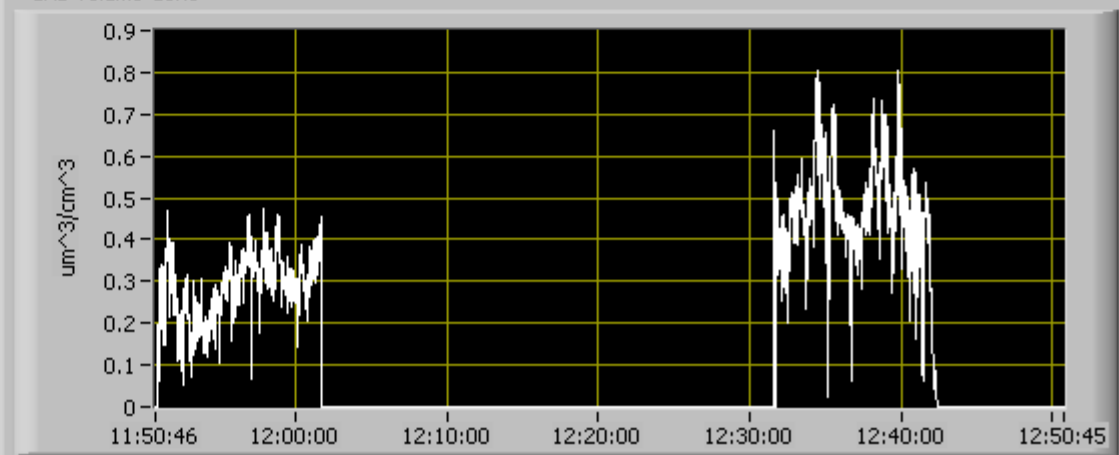


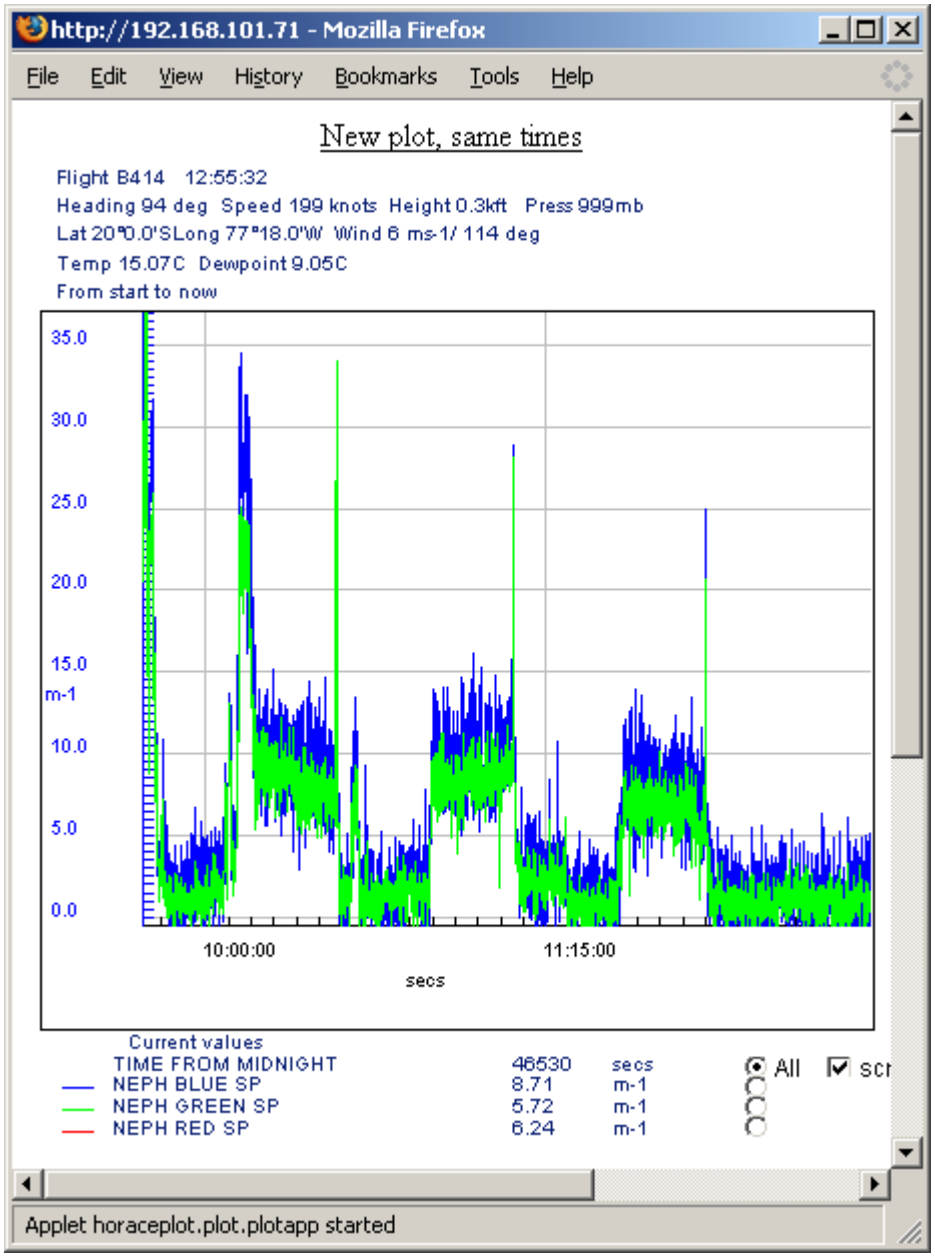
Standard Charts | Selectable Charts | Forward/Backscatter

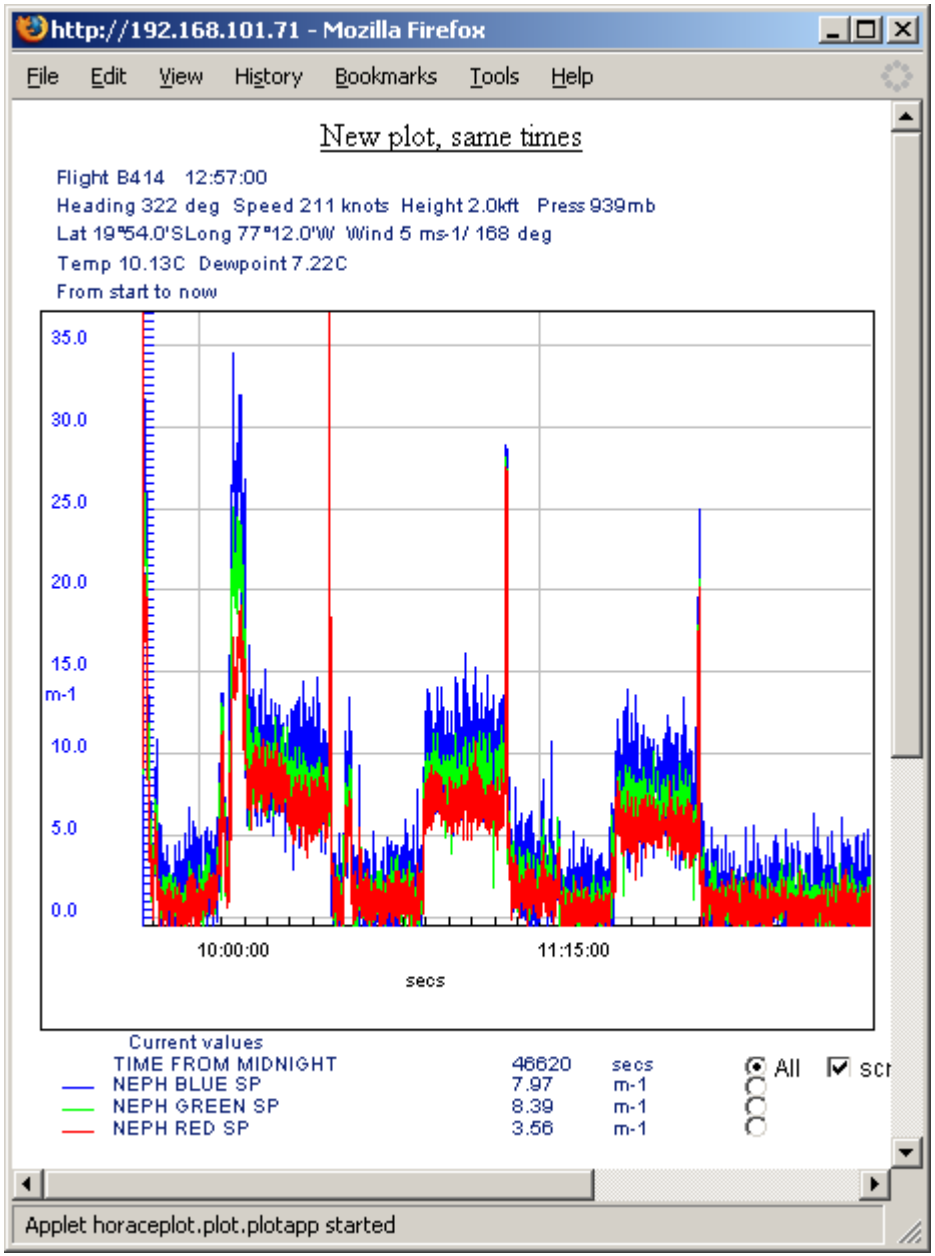
CAS # Conc



CAS Volume Conc







End R5.3 at 500ft start P18 to FL230

DMT Particle Analysis and Display System

Program Configure

Sampling | Recording | Read a File

Display Range: All

00 d 12:35:25

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

Enable: Enabled

COM Port: 4

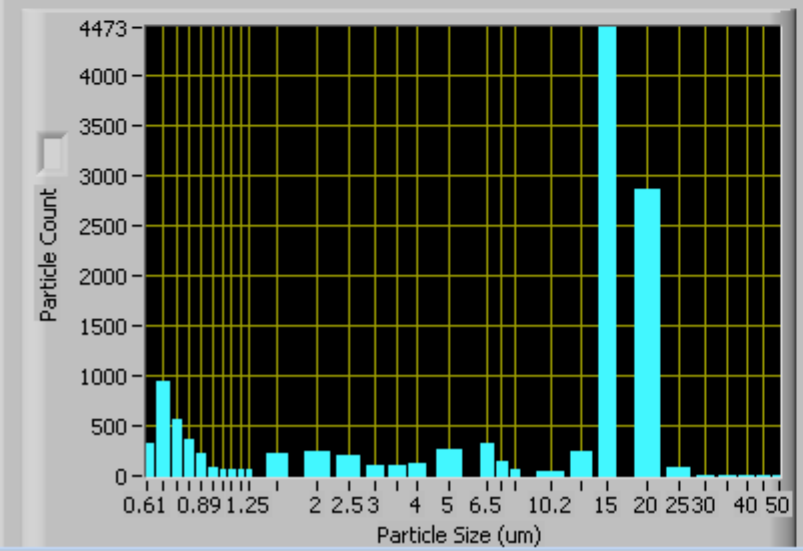
No Fault

v2.5.3

CAS Data | CAS Housekeeping

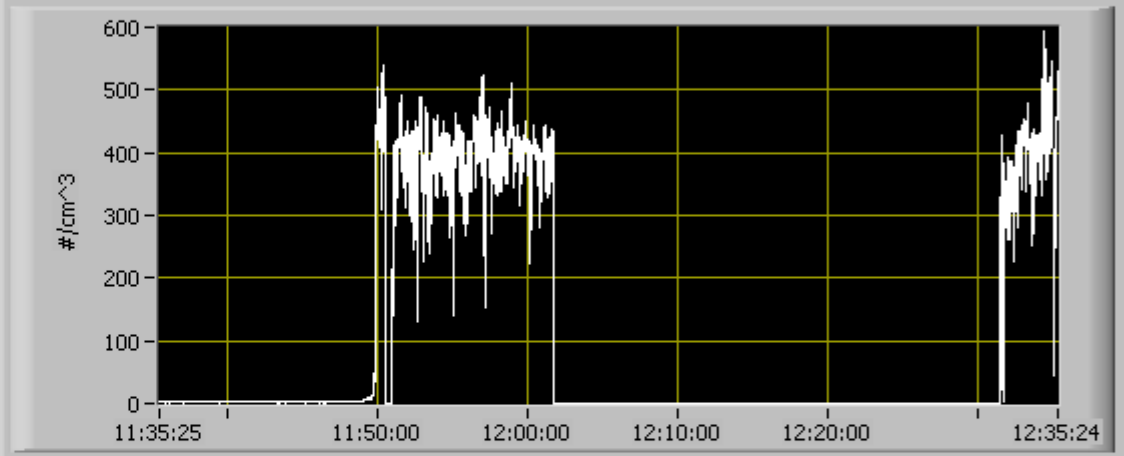
#Conc (#/cm^3): 529.42	Sum of Particles: 48970	LWC Hotwire (V): 1.53
CAS LWC (g/m^3): 0.65	Forward Overflow: 0	LWC Slave Mon (V): 0.32
CAS MVD (um): 15.66	Backward Overflow: 0	Laser Curr Mon (mA): 87.5
CAS ED(um): 15.55	Ambient Temp (C): NaN	Laser Pwr Mon (V): 43
Dynamic Pressure: 0	Static Pressure: 0	Airspeed (m/s): 91.8

Forward Scattering | Backward Scattering

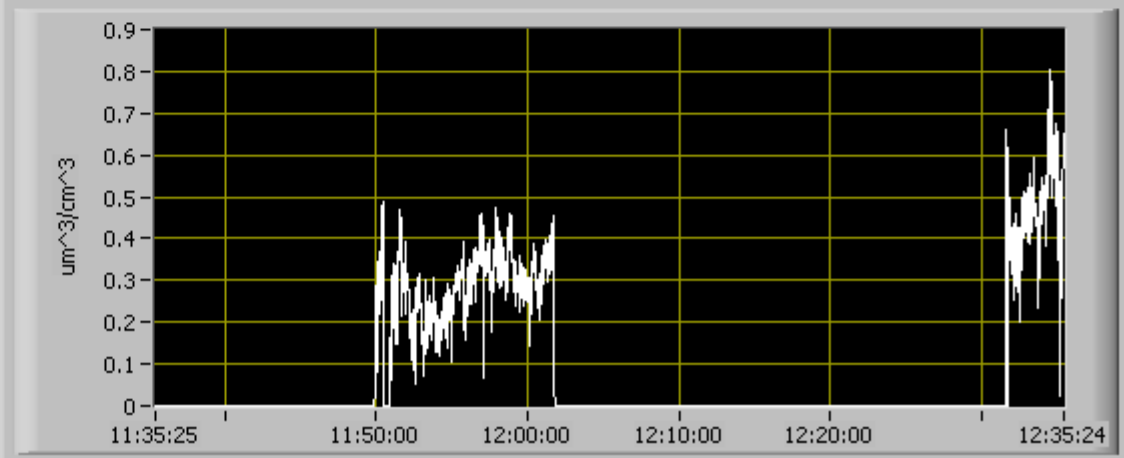


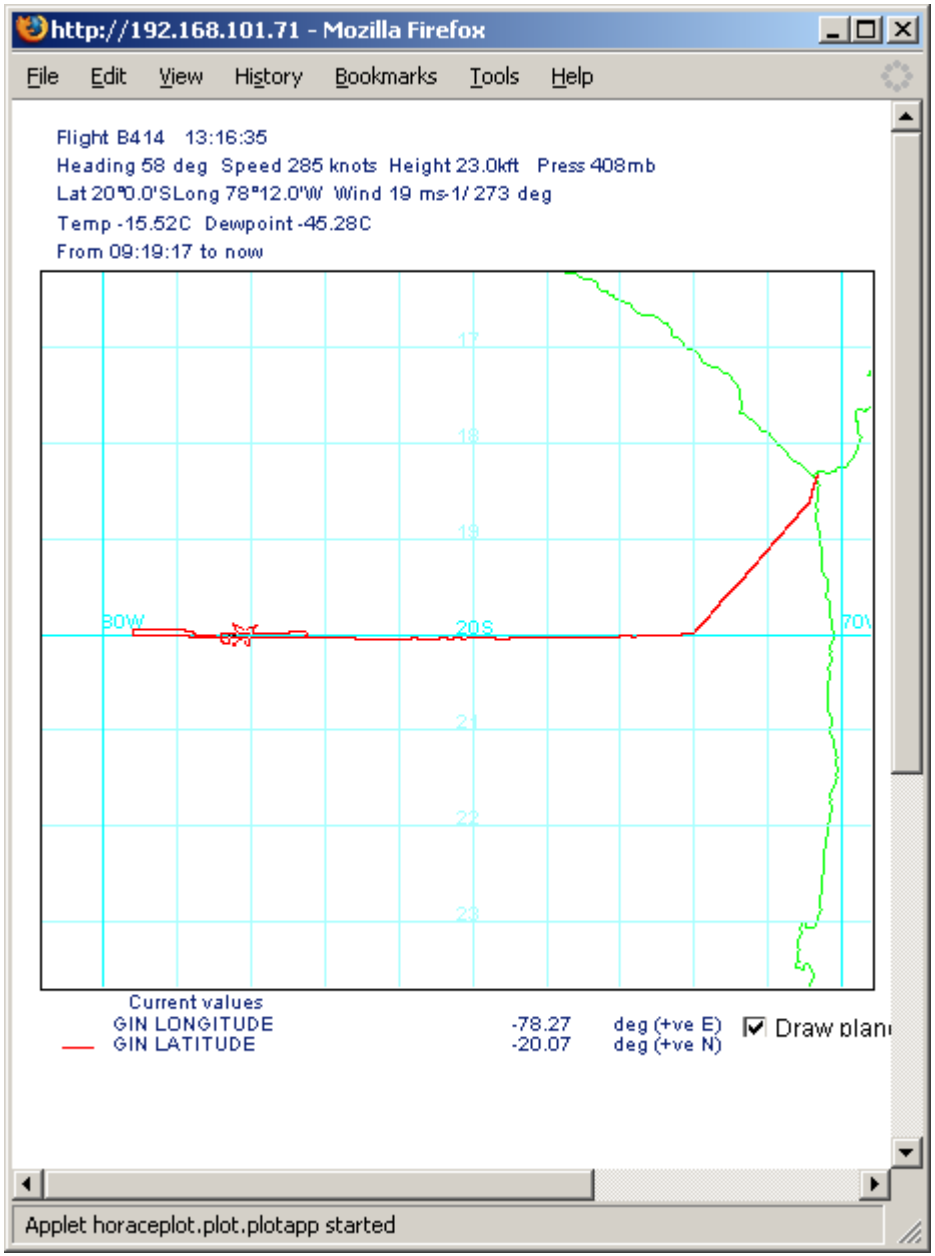
Standard Charts | Selectable Charts | Forward/Backscatter

CAS # Conc

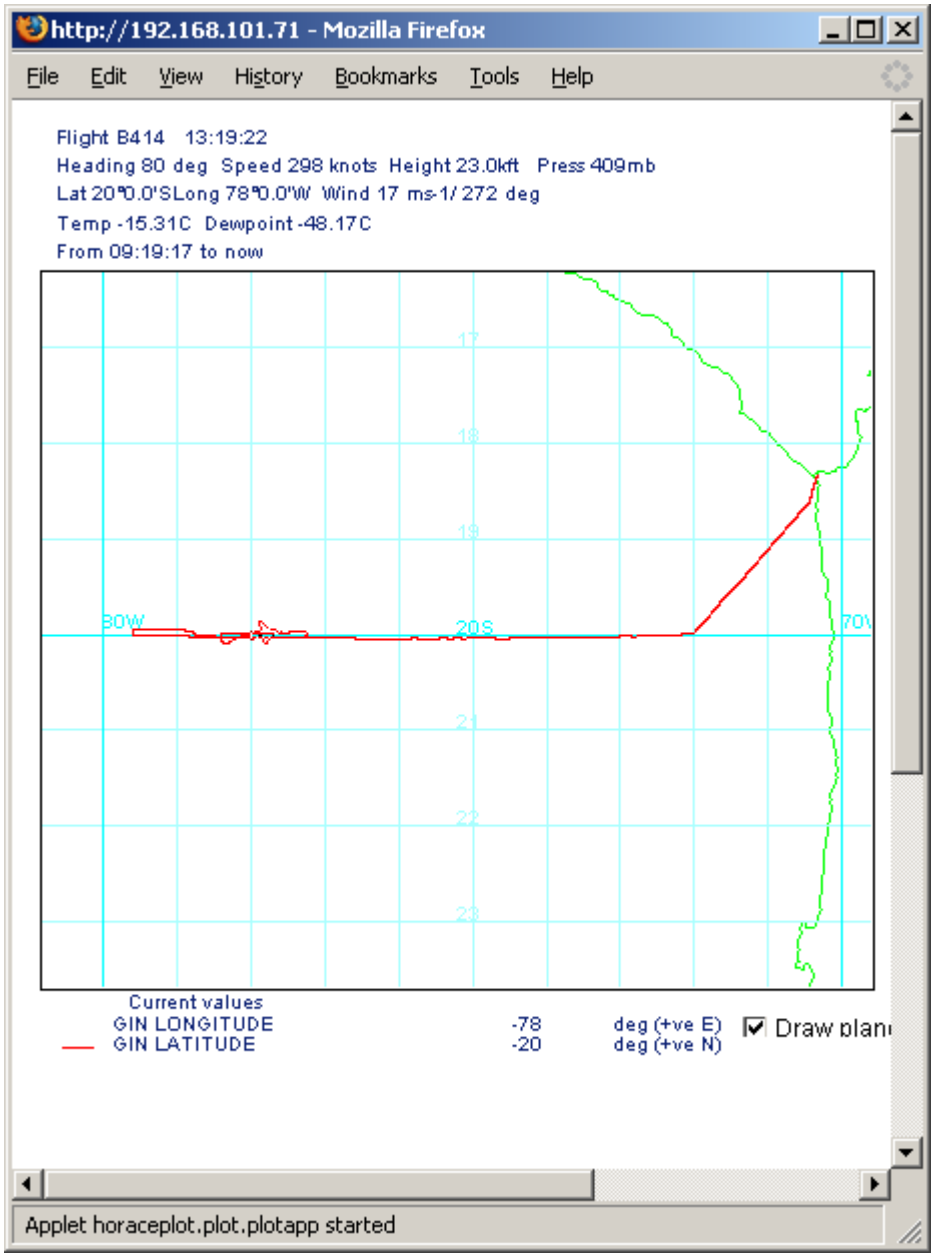


CAS Volume Conc

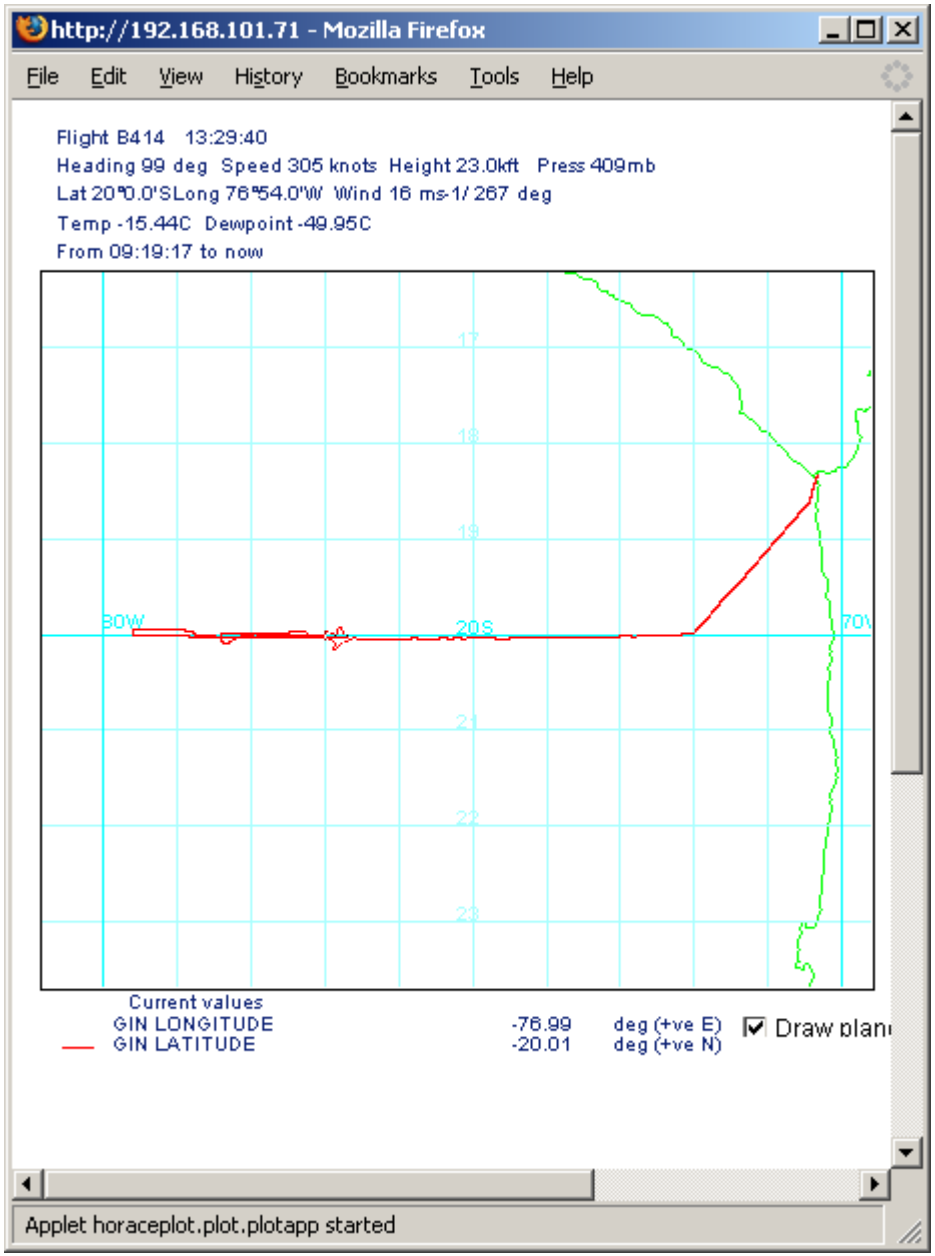




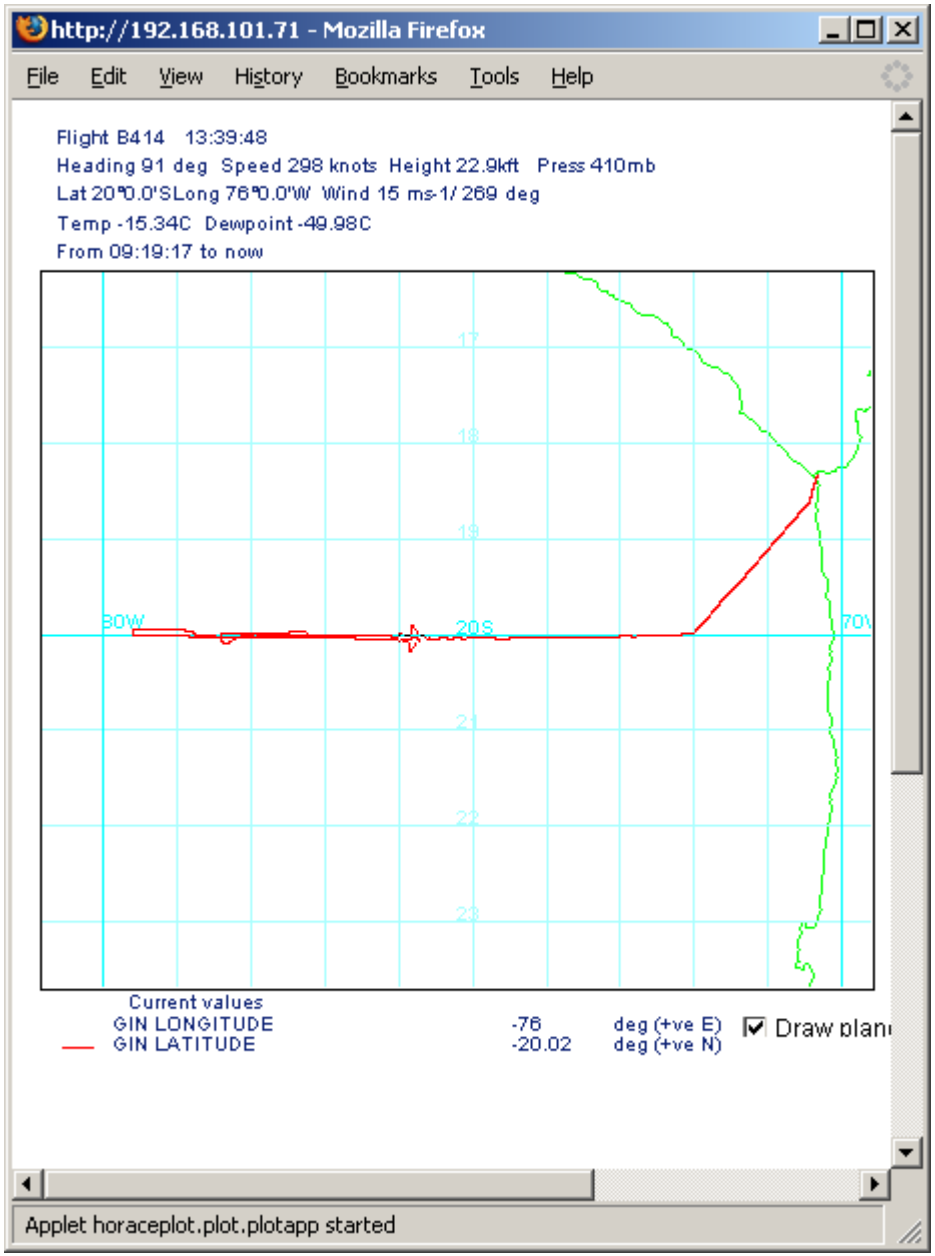
Just after end of P18 Start R6 at FL230


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 13:19:22
Heading 80 deg Speed 298 knots Height 23.0kft Press 409mb
Lat 20°0.0'S Long 78°0.0'W Wind 17 ms-1/ 272 deg
Temp -15.31C Dewpoint -48.17C
From 09:19:17 to now
17
18
19
80W
20S
70
21
22
23
Current values
GIN LONGITUDE -78 deg (+ve E)
GIN LATITUDE -20 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

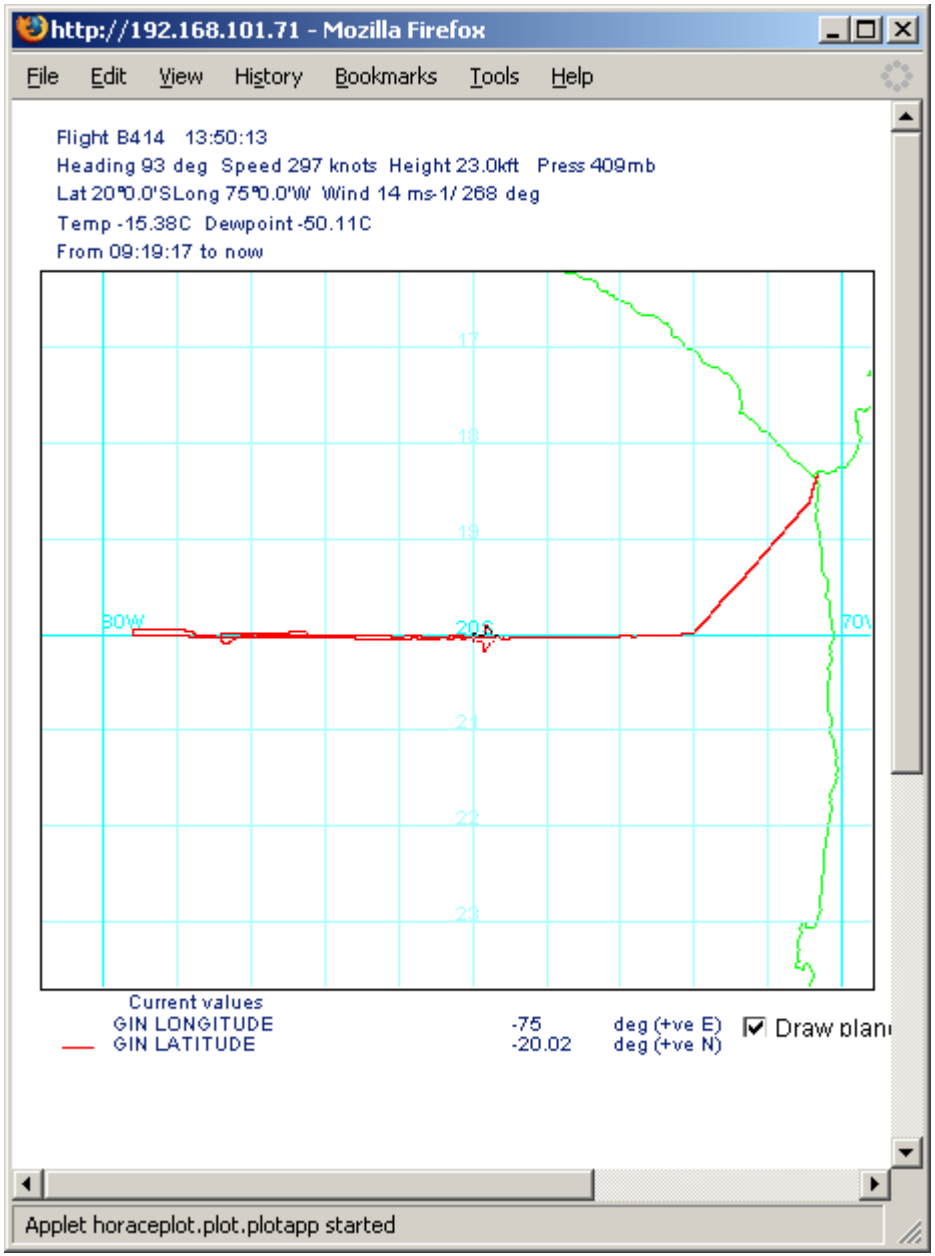
DS1


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 13:29:40
Heading 99 deg Speed 305 knots Height 23.0kft Press 409mb
Lat 20°0.0'S Long 76°54.0'W Wind 16 ms-1/ 267 deg
Temp -15.44C Dewpoint -49.95C
From 09:19:17 to now
17
18
19
80W
20S
70
21
22
23
Current values
GIN LONGITUDE -76.99 deg (+ve E)
GIN LATITUDE -20.01 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

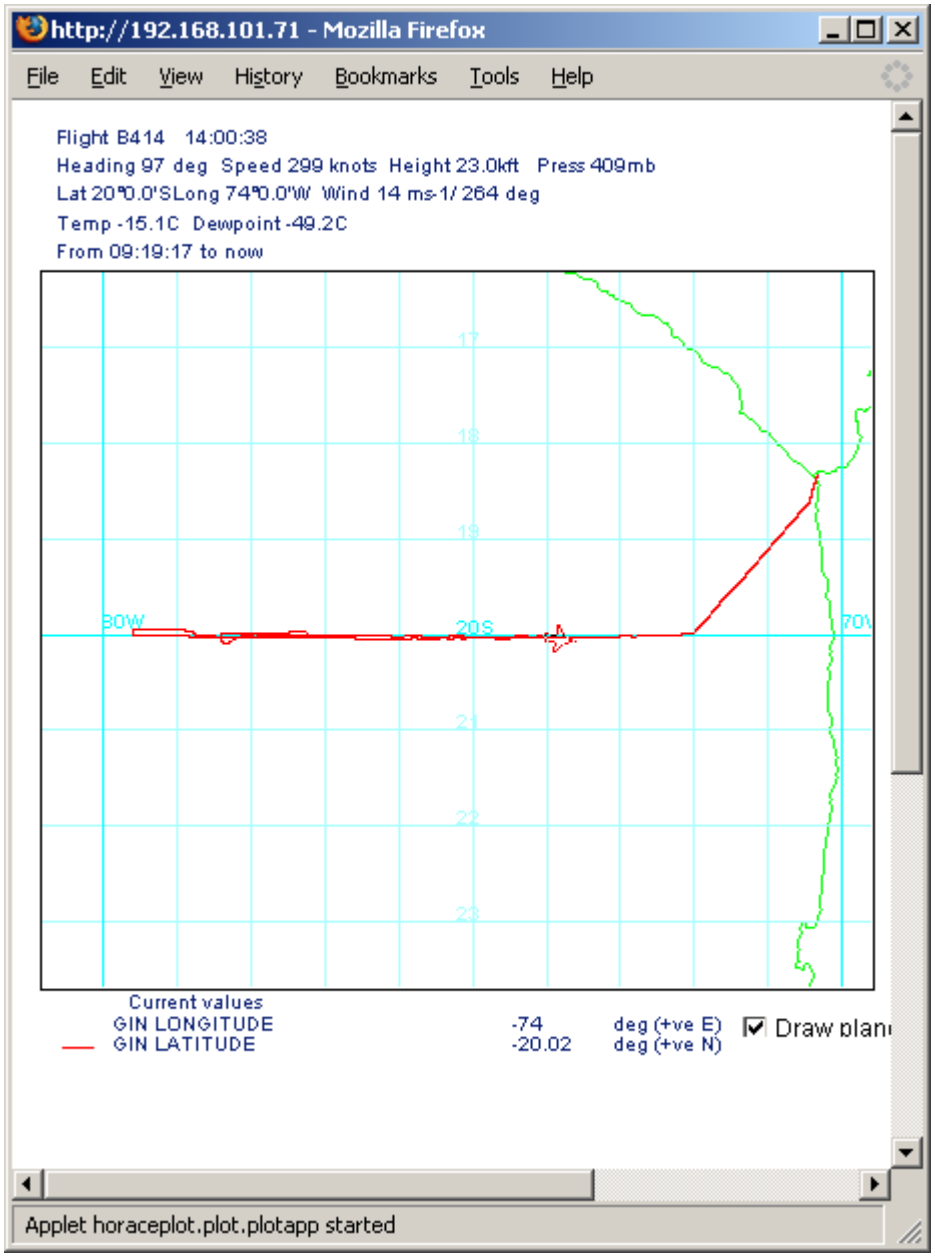
DS2


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 13:39:48
Heading 91 deg Speed 298 knots Height 22.9kft Press 410mb
Lat 20°0.0'S Long 76°0.0'W Wind 15 ms-1/ 269 deg
Temp -15.34C Dewpoint -49.98C
From 09:19:17 to now
17
18
19
80W
20S
70W
21
22
23
Current values
GIN LONGITUDE -76 deg (+ve E)
GIN LATITUDE -20.02 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

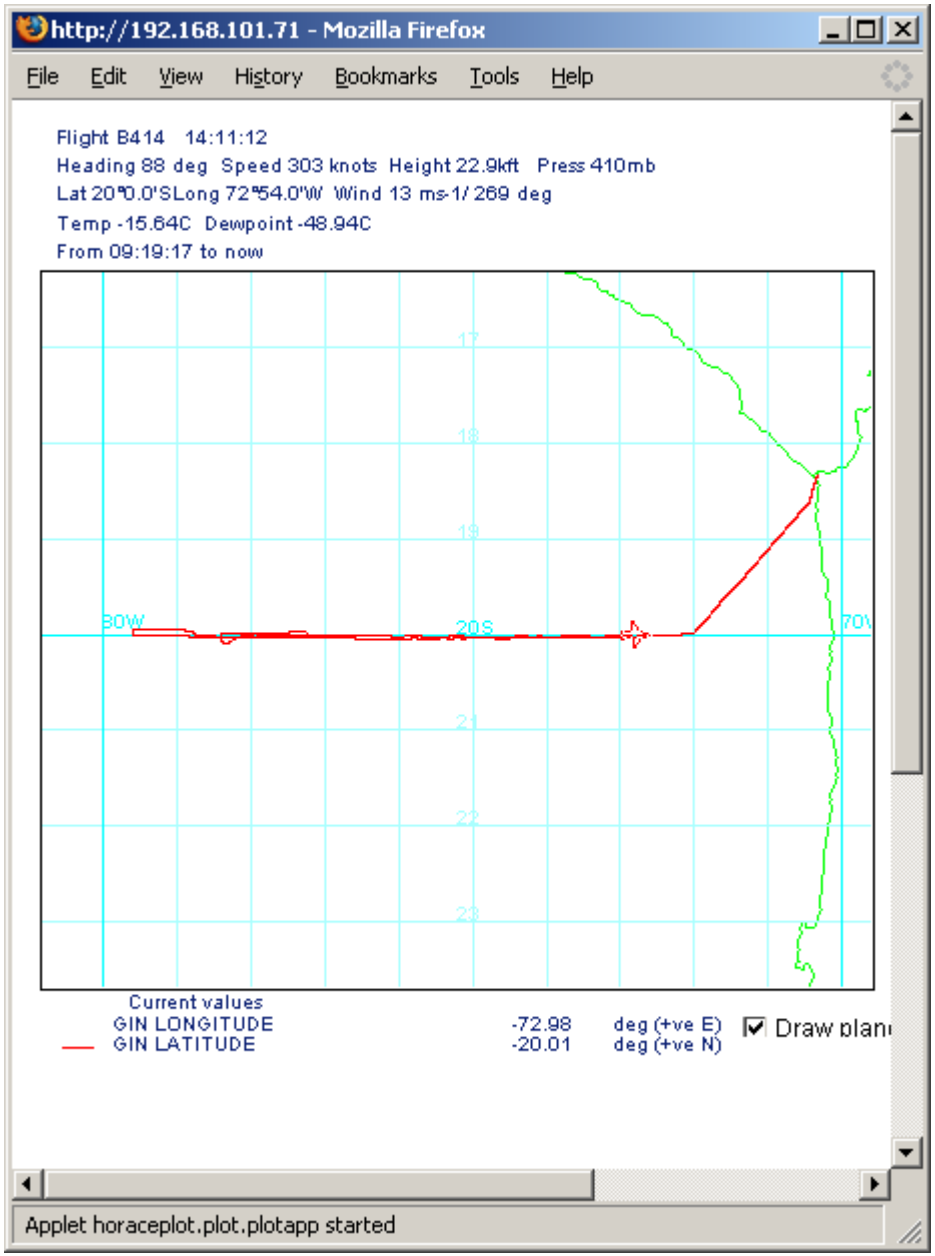
DS3


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 13:50:13
Heading 93 deg Speed 297 knots Height 23.0kft Press 409mb
Lat 20°0.0'S Long 75°0.0'W Wind 14 ms-1/ 268 deg
Temp -15.38C Dewpoint -50.11C
From 09:19:17 to now
17
18
19
80W
20S
70W
21
22
23
Current values
GIN LONGITUDE -75 deg (+ve E)
GIN LATITUDE -20.02 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

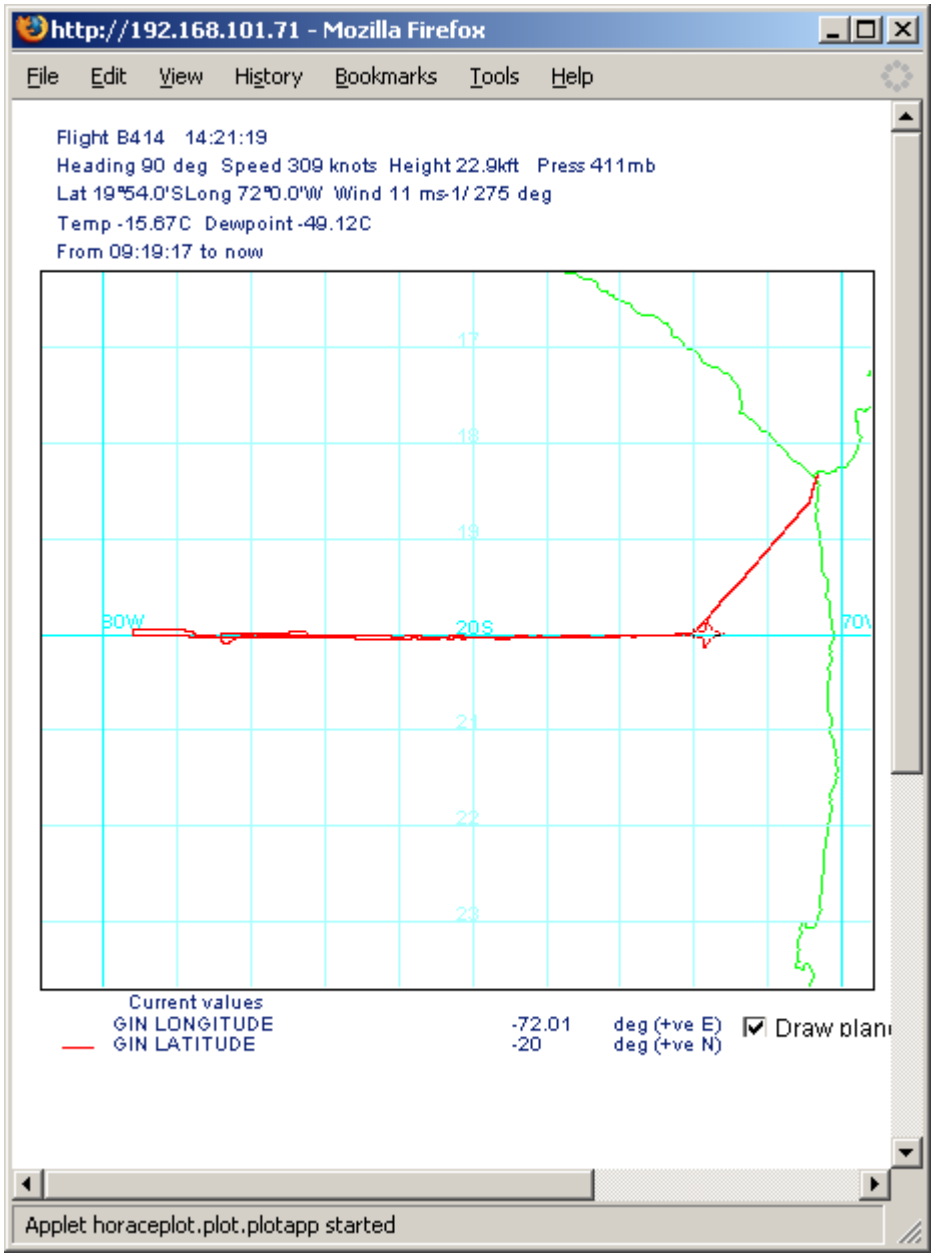
DS4


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 14:00:38
Heading 97 deg Speed 299 knots Height 23.0kft Press 409mb
Lat 20°0.0'S Long 74°0.0'W Wind 14 ms-1/ 264 deg
Temp -15.1C Dewpoint -49.2C
From 09:19:17 to now
17
18
19
80W
20S
70W
21
22
23
Current values
GIN LONGITUDE -74 deg (+ve E)
GIN LATITUDE -20.02 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

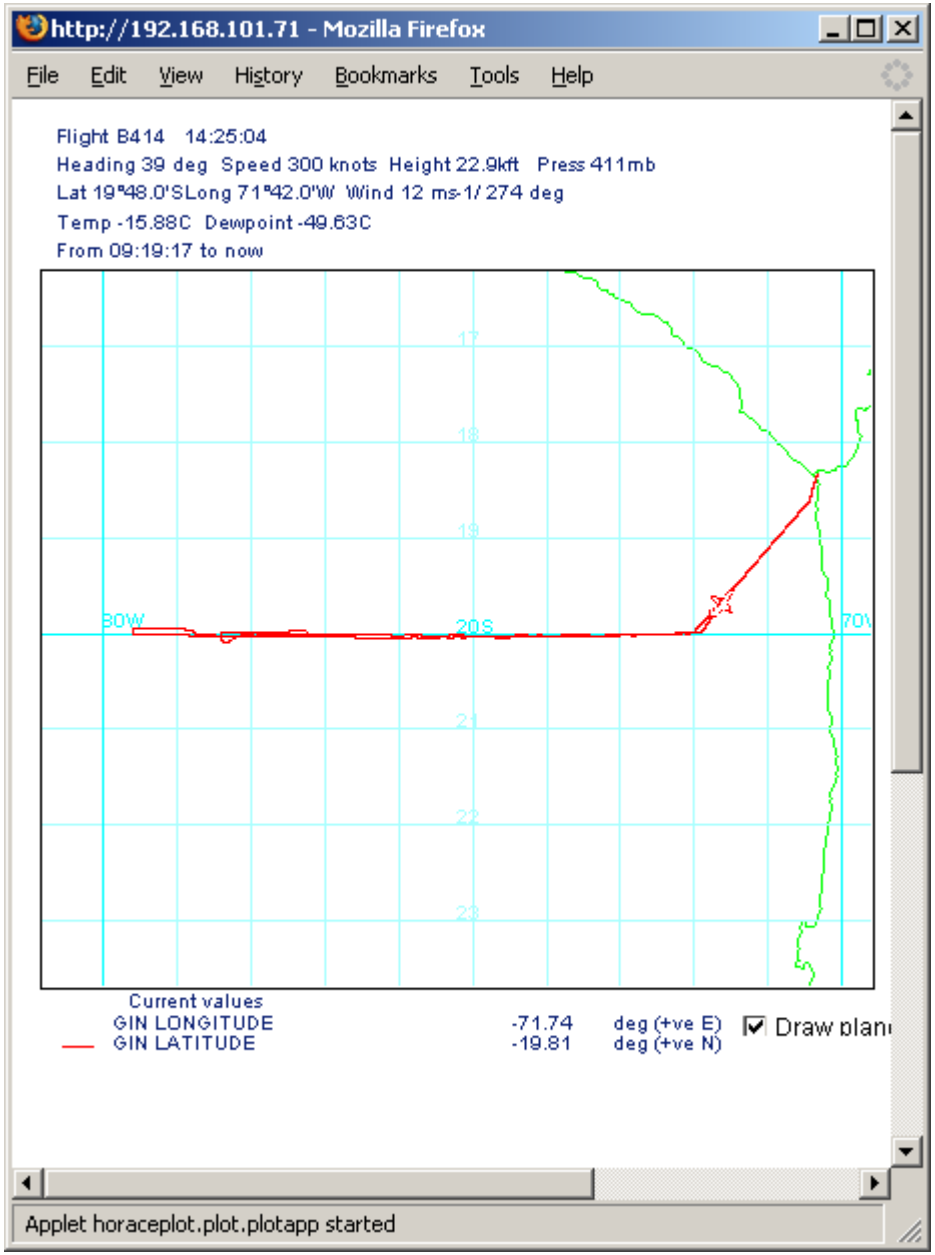
DS5


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 14:11:12
Heading 88 deg Speed 303 knots Height 22.9kft Press 410mb
Lat 20°0.0'S Long 72°54.0'W Wind 13 ms-1/ 269 deg
Temp -15.64C Dewpoint -48.94C
From 09:19:17 to now
17
18
19
80W
20S
70W
21
22
23
Current values
GIN LONGITUDE -72.98 deg (+ve E)
GIN LATITUDE -20.01 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

DS6



DS7

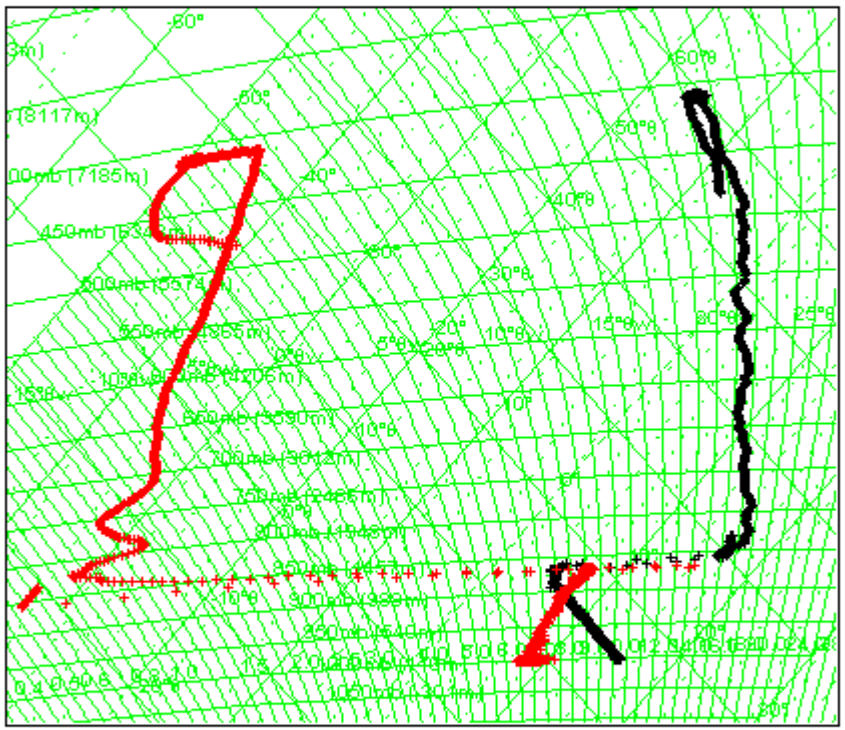


R6 end start P19 at FL230

http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Flight B414 14:28:56
Heading 44 deg Speed 293 knots Height 19.1kft Press 481mb
Lat 19°30.0'S Long 71°30.0'W Wind 15 ms-1/ 295 deg
Temp -7.2C Dewpoint -40.72C
From 12:30:00 to now



Current values

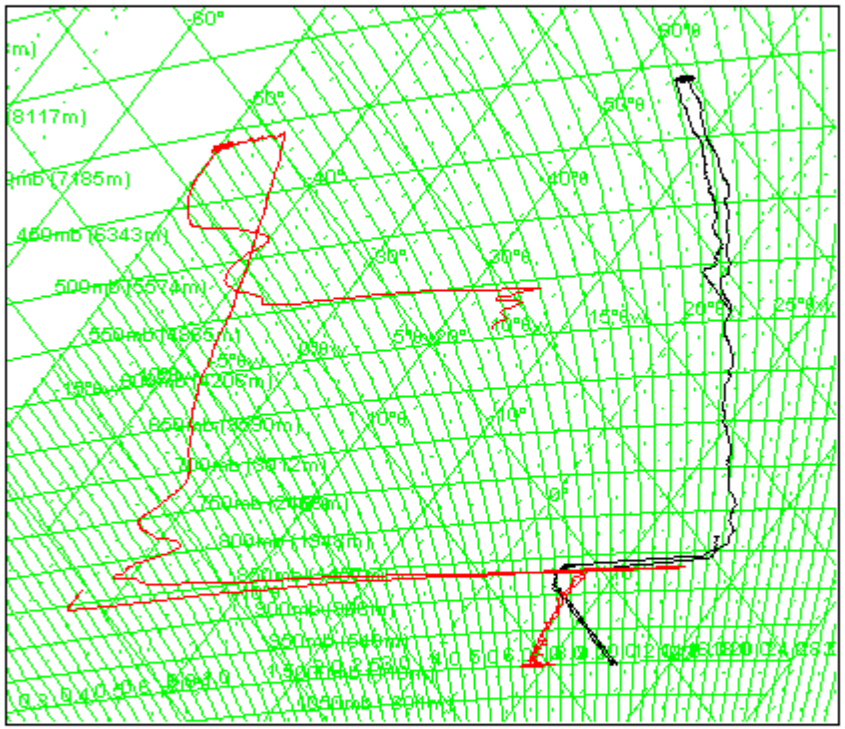
	STATIC PRESSURE	481.93	mb
++++	DEICED TRUE AIR TEMP	-7.2	deg C
++++	DEW POINT	-40.73	deg C

Applet horaceplot.plot.plotapp started

http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Flight B414 14:34:01
Heading 40 deg Speed 257 knots Height 14.2kft Press 590mb
Lat 19°12.0'S Long 71°6.0'W Wind 9 ms-1/ 294 deg
Temp 2.75C Dewpoint -15.8C
From 12:30:00 to now



Current values

	STATIC PRESSURE	590.09	mb
——	DEICED TRUE AIR TEMP	2.76	deg C
——	DEW POINT	-15.81	deg C

Applet horaceplot.plot.plotapp started

DMT Particle Analysis and Display System

Program Configure

Sampling | Recording | Read a File

Display Range: All

00 d 14:36:16

(0) CIP Grayscale | (1) CAS | (2) Hotwire_LWC | (3) SPP_200 | Setup

Enable: Enabled

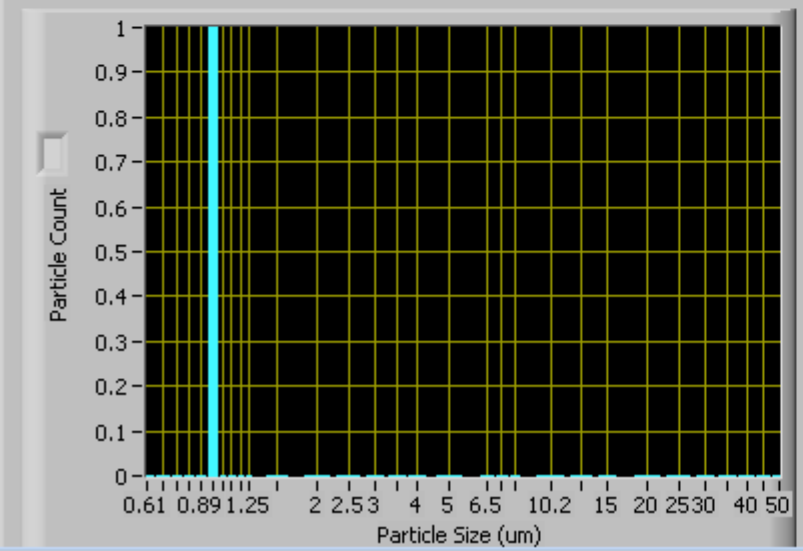
COM Port: 4 — No Fault

v2.5.3

CAS Data | CAS Housekeeping

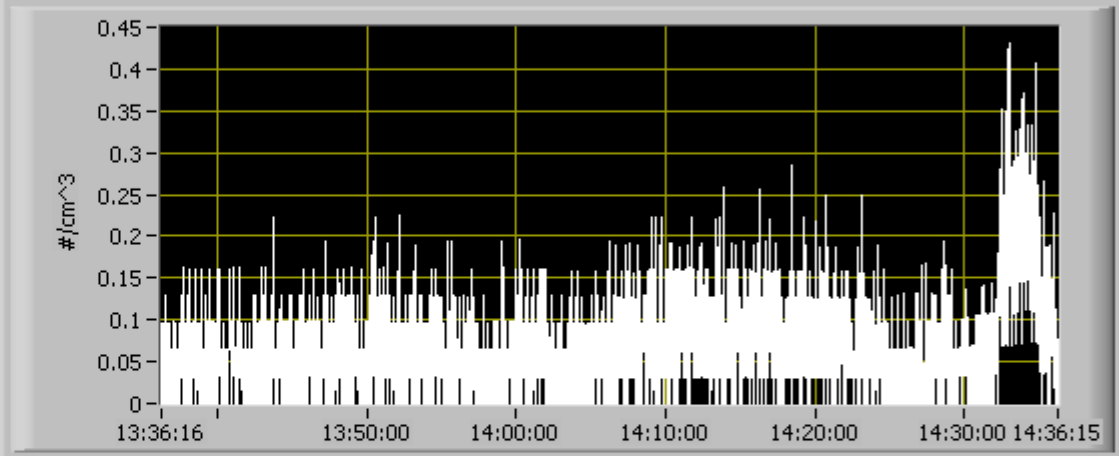
#Conc (#/cm^3): 0.04	Sum of Particles: 30	LWC Hotwire (V): 0.96
CAS LWC (g/m^3): 0	Forward Overflow: 0	LWC Slave Mon (V): 0.32
CAS MVD (um): 0.92	Backward Overflow: 0	Laser Curr Mon (mA): 87.7
CAS ED(um): 0.93	Ambient Temp (C): NaN	Laser Pwr Mon (V): 43.1
Dynamic Pressure: 0	Static Pressure: 0	Airspeed (m/s): 107.1

Forward Scattering | Backward Scattering

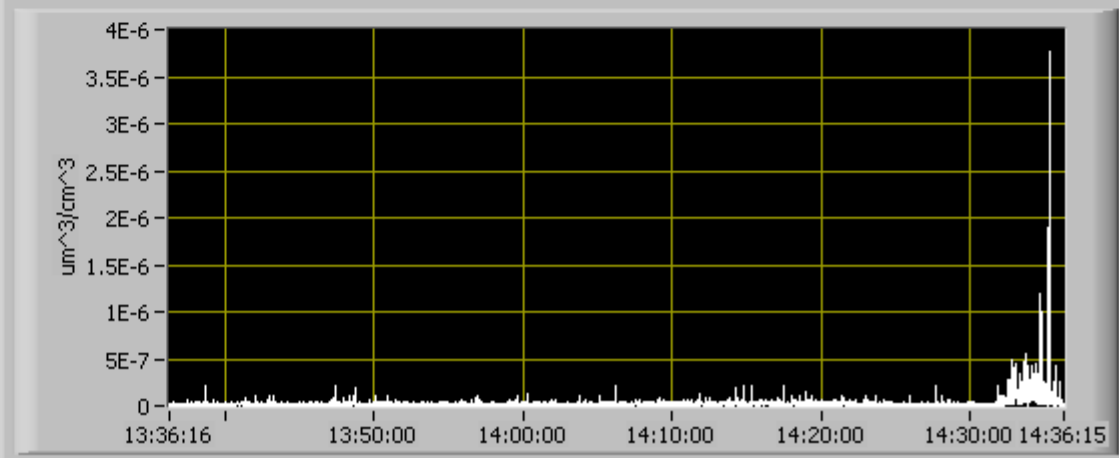


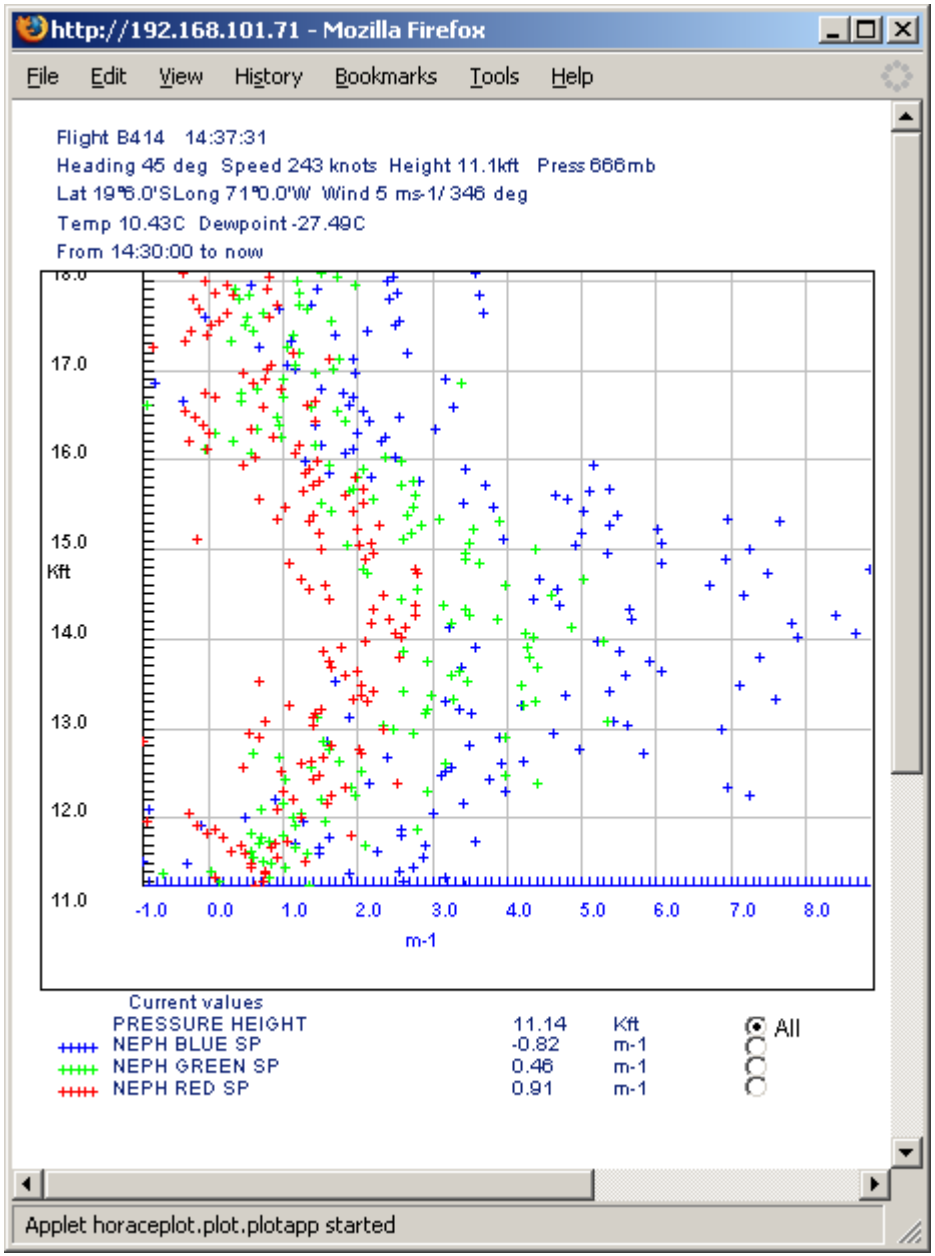
Standard Charts | Selectable Charts | Forward/Backscatter

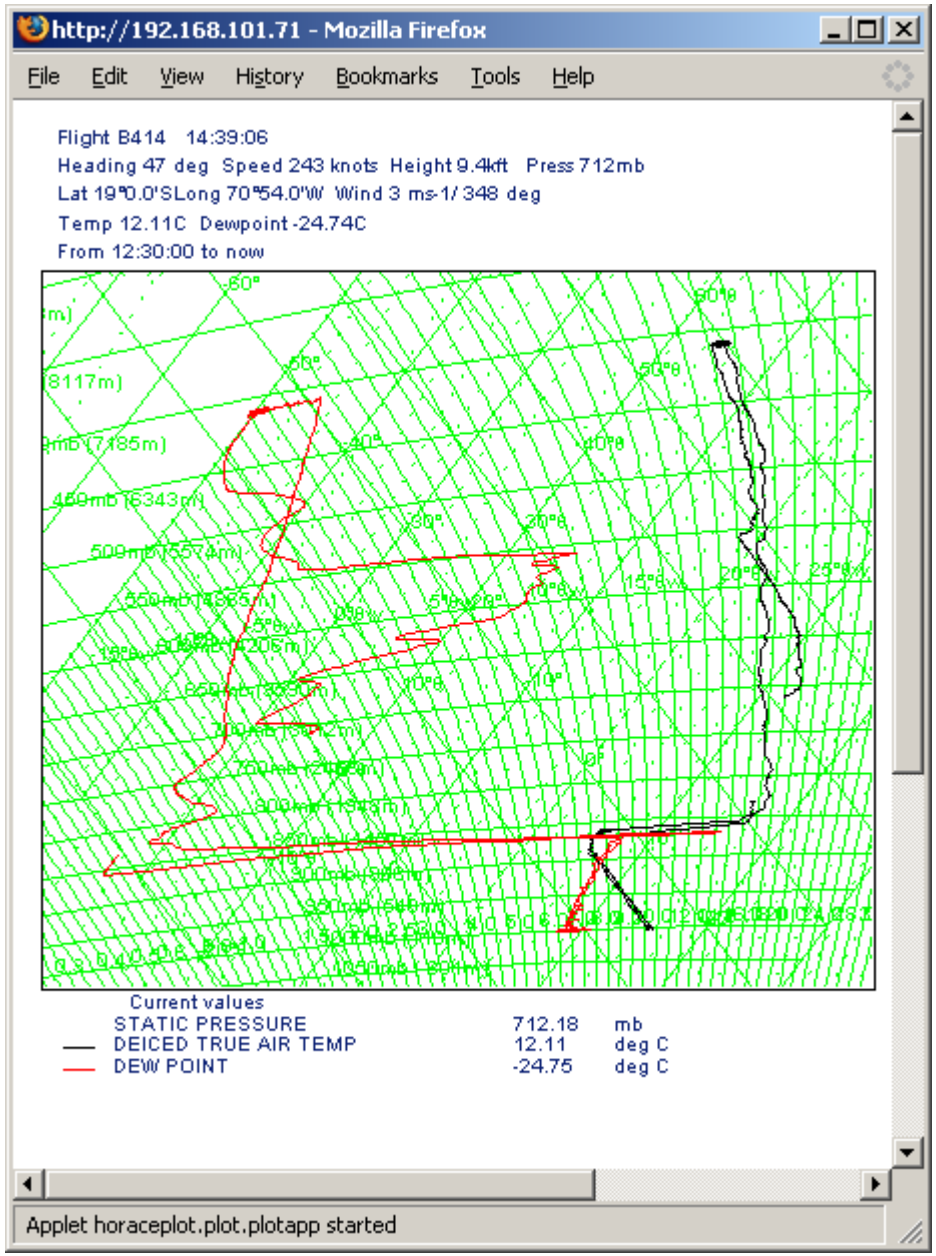
CAS # Conc



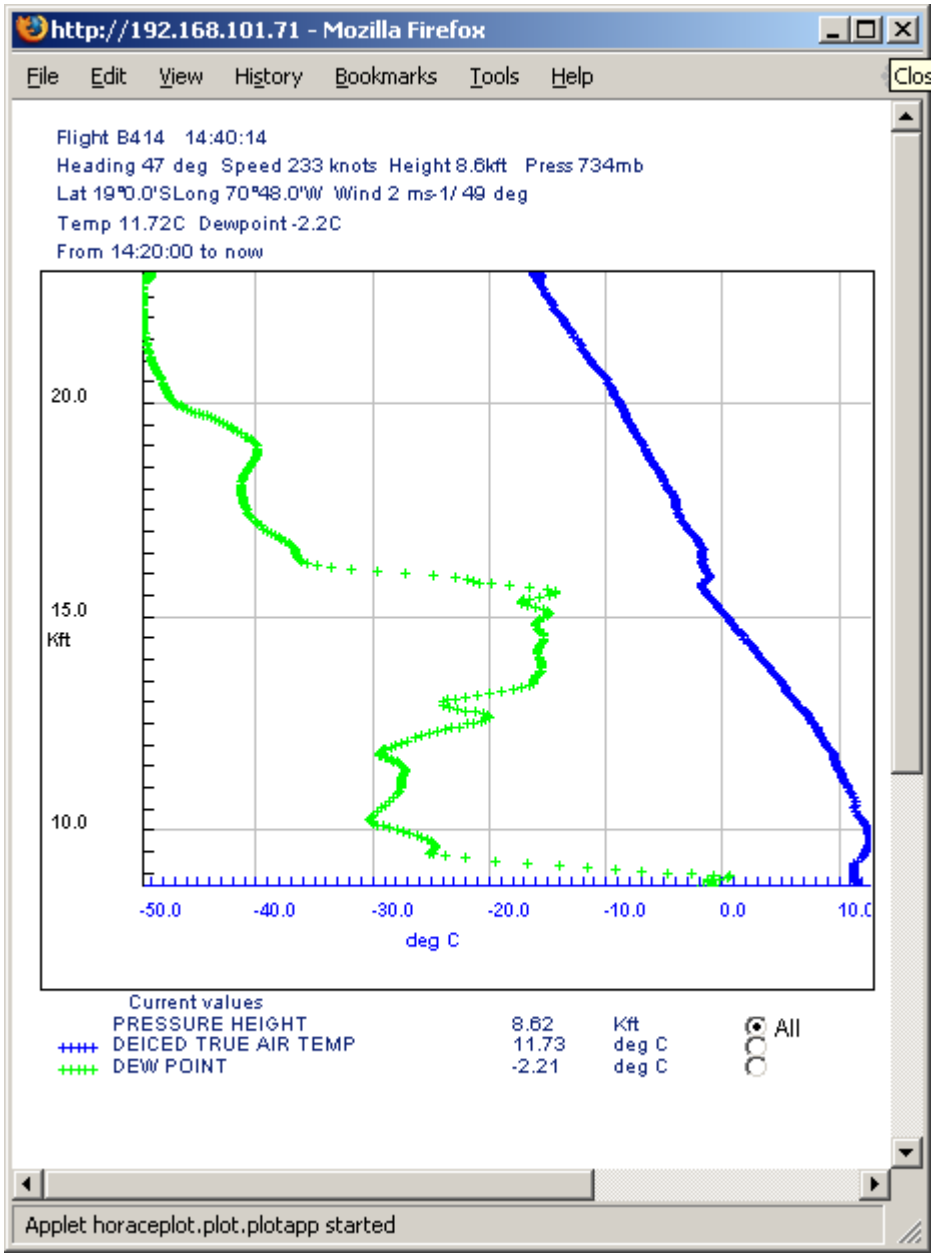
CAS Volume Conc

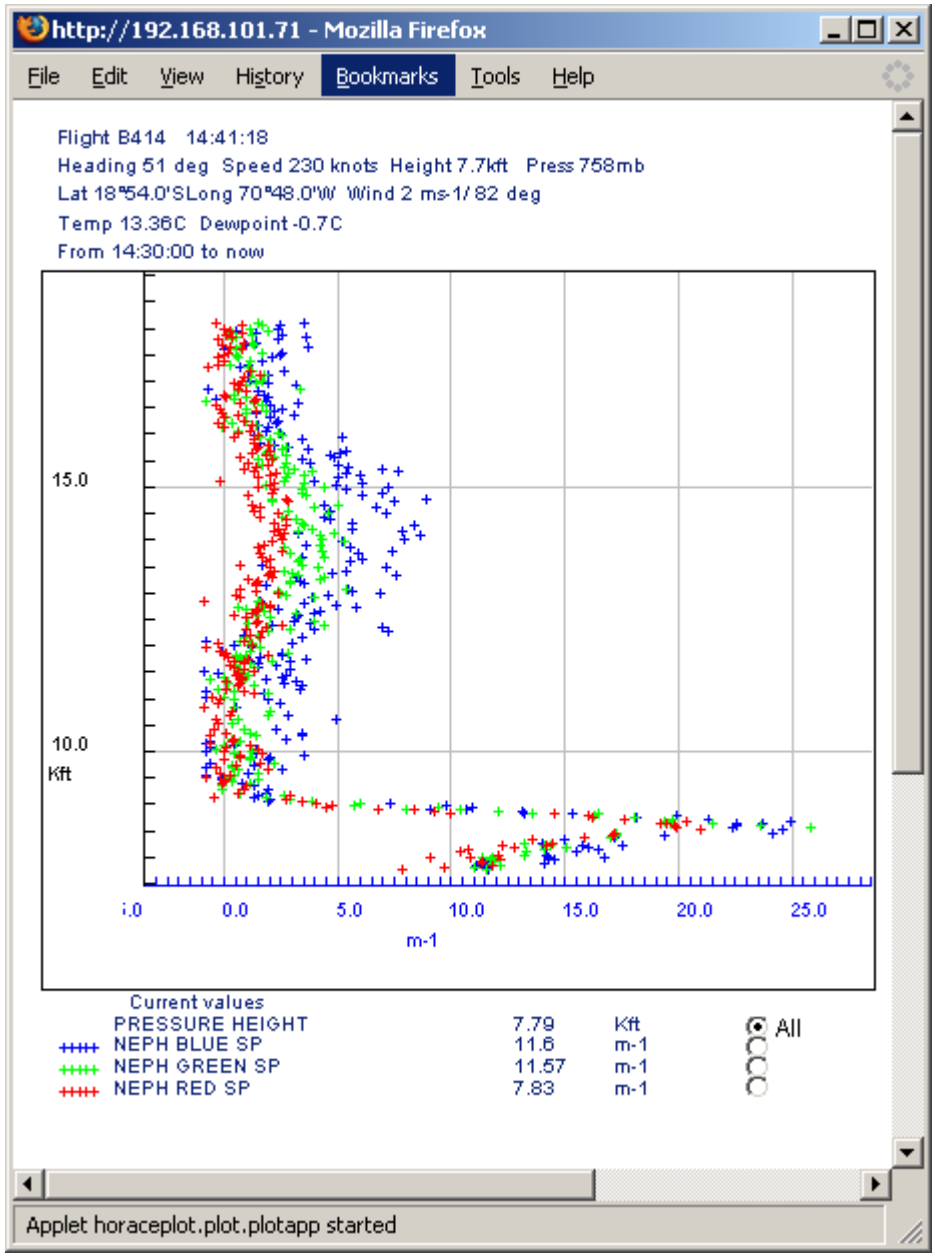






Inc in scatt when humidity inc

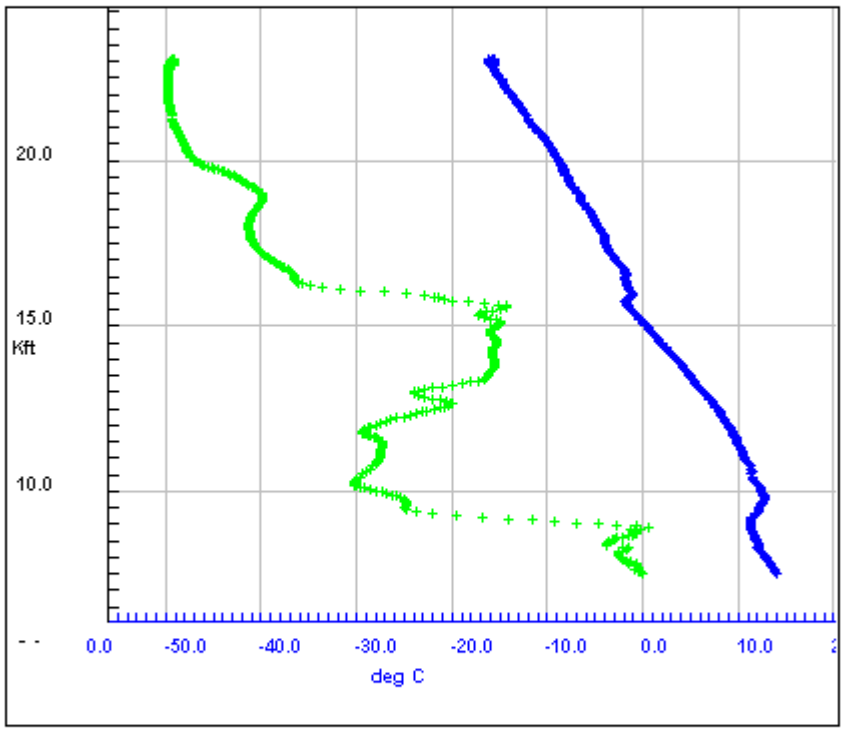

http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 14:40:14
Heading 47 deg Speed 233 knots Height 8.6kft Press 734mb
Lat 19°0.0'S Long 70°48.0'W Wind 2 ms-1/ 49 deg
Temp 11.72C Dewpoint -2.2C
From 14:20:00 to now
20.0
15.0
Kft
10.0
-50.0 -40.0 -30.0 -20.0 -10.0 0.0 10.0
deg C
Current values
PRESSURE HEIGHT 8.62 Kft
DEICED TRUE AIR TEMP 11.73 deg C
DEW POINT -2.21 deg C
All
Applet horaceplot.plot.plotapp started


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 14:41:18
Heading 51 deg Speed 230 knots Height 7.7kft Press 758mb
Lat 18°54.0'S Long 70°48.0'W Wind 2 ms-1/ 82 deg
Temp 13.36C Dewpoint -0.7C
From 14:30:00 to now
15.0
10.0
Kft
0.0 5.0 10.0 15.0 20.0 25.0
m-1
Current values
PRESSURE HEIGHT 7.79 Kft
NEPH BLUE SP 11.6 m-1
NEPH GREEN SP 11.57 m-1
NEPH RED SP 7.83 m-1
All
Applet horaceplot.plot.plotapp started

http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Flight B414 14:41:49
Heading 47 deg Speed 232 knots Height 7.5kft Press 766mb
Lat 18°54.0'S Long 70°42.0'W Wind 1 ms-1/ 49 deg
Temp 13.93C Dewpoint 0.01C
From 14:20:00 to now



Current values

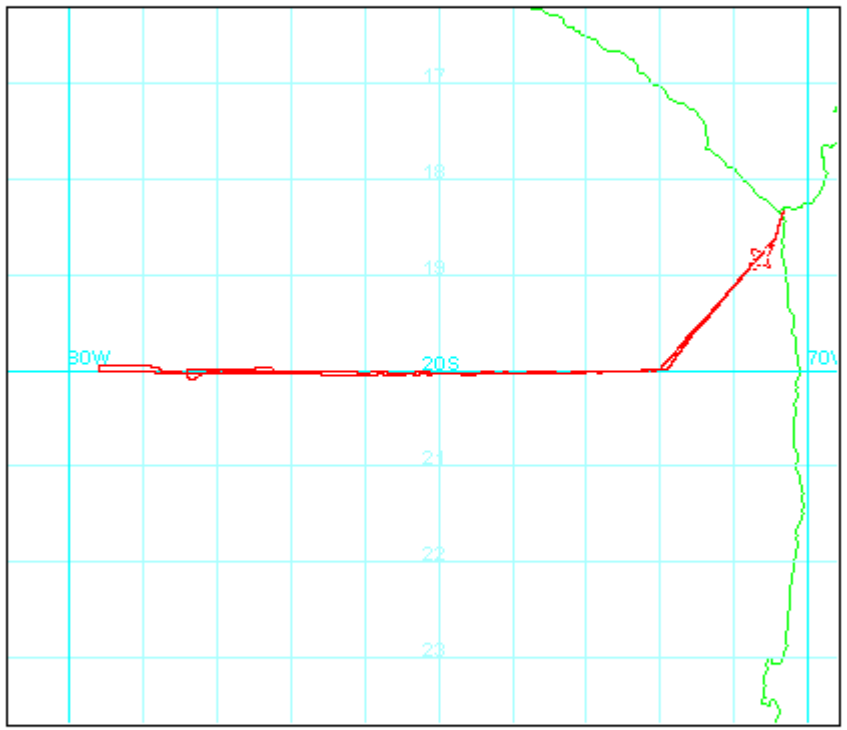
PRESSURE HEIGHT	7.53	Kft	All
DEICED TRUE AIR TEMP	13.93	deg C	
DEW POINT	0.01	deg C	

Applet horaceplot.plot.plotapp started

http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

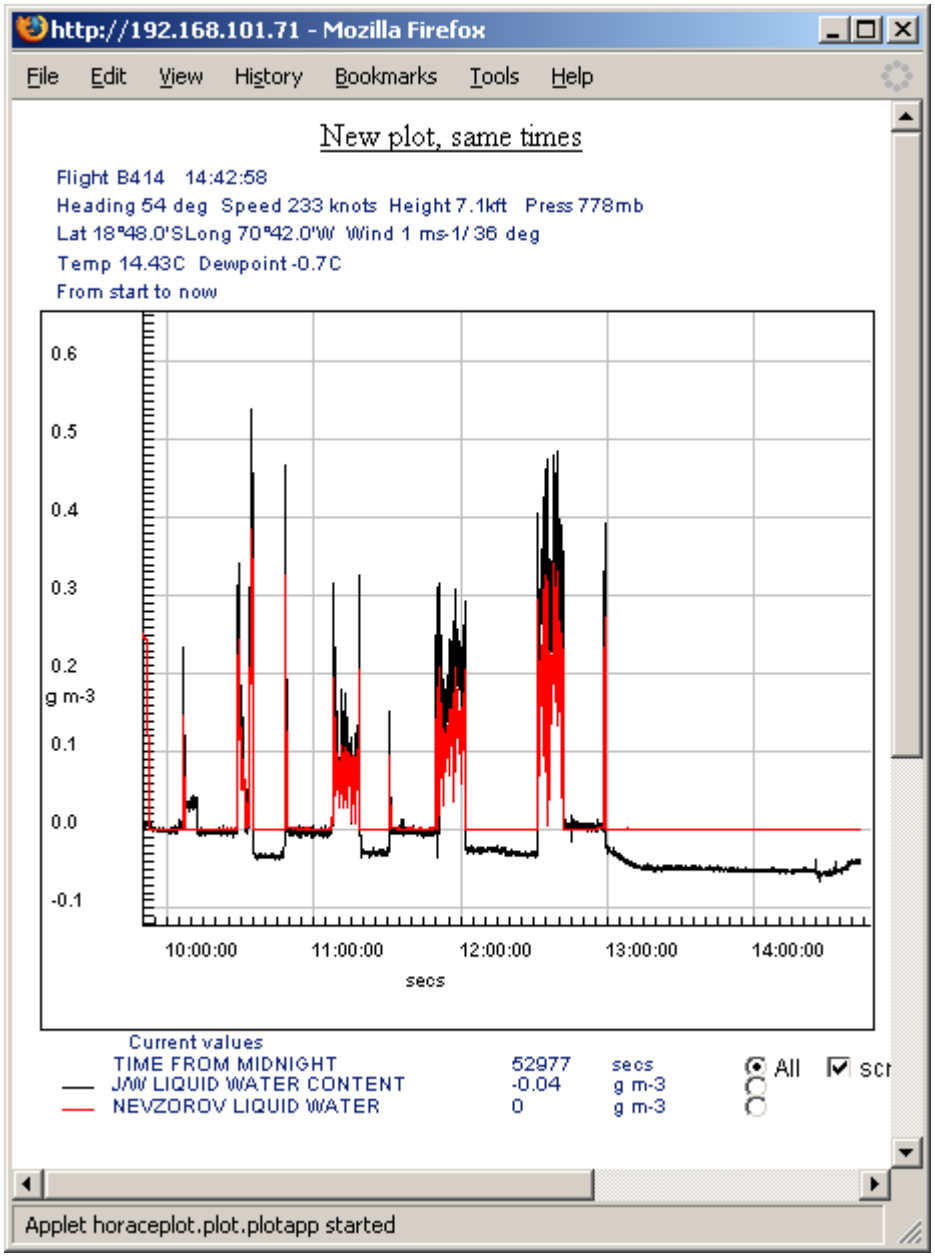
Flight B414 14:42:07
Heading 45 deg Speed 234 knots Height 7.3kft Press 770mb
Lat 18°54.0'S Long 70°42.0'W Wind 1 ms-1/ 22 deg
Temp 14.17C Dewpoint 0.24C
From 09:19:17 to now

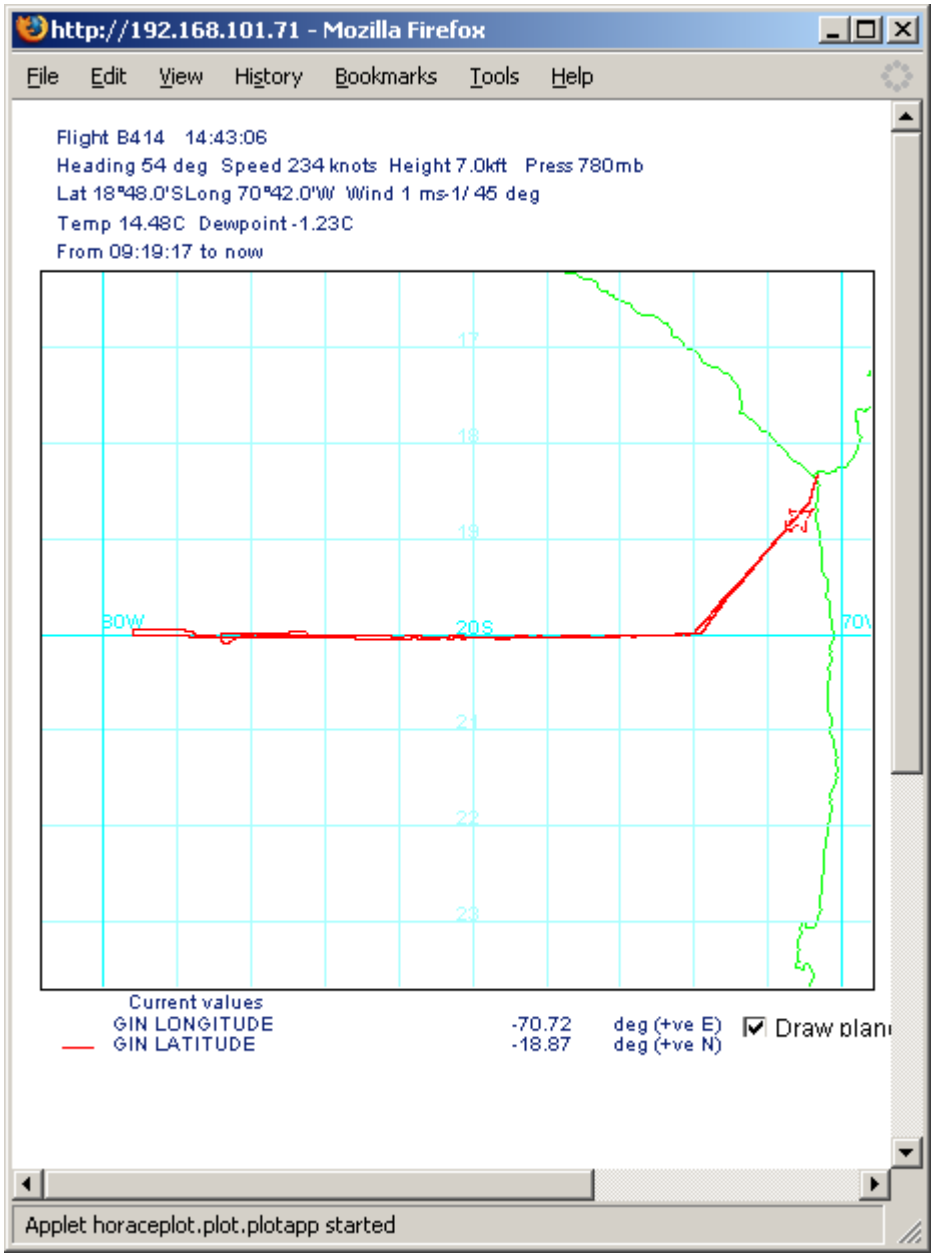


Current values

GIN LONGITUDE	-70.77	deg (+ve E)	Draw plan
GIN LATITUDE	-18.92	deg (+ve N)	

Applet horaceplot.plot.plotapp started


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
New plot, same times
Flight B414 14:42:58
Heading 54 deg Speed 233 knots Height 7.1kft Press 778mb
Lat 18°48.0'S Long 70°42.0'W Wind 1 ms-1/ 36 deg
Temp 14.43C Dewpoint -0.7C
From start to now
0.6
0.5
0.4
0.3
0.2
g m-3
0.1
0.0
-0.1
10:00:00
11:00:00
12:00:00
13:00:00
14:00:00
secs
Current values
TIME FROM MIDNIGHT 52977 secs
J/W LIQUID WATER CONTENT -0.04 g m-3
NEVZOROV LIQUID WATER 0 g m-3
All
Applet horaceplot.plot.plotapp started

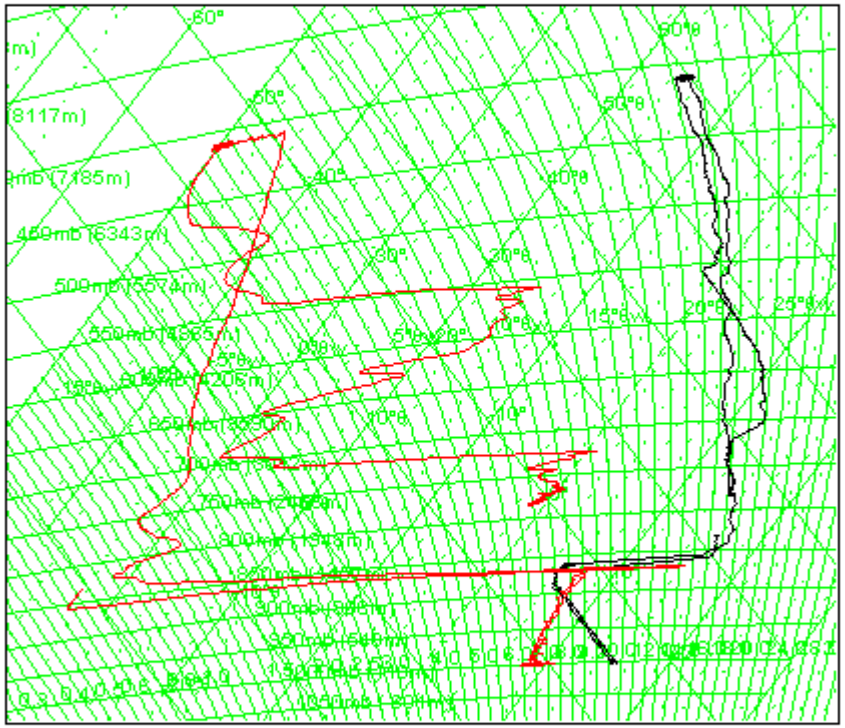

http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 14:43:06
Heading 54 deg Speed 234 knots Height 7.0kft Press 780mb
Lat 18°48.0'S Long 70°42.0'W Wind 1 ms-1/ 45 deg
Temp 14.48C Dewpoint -1.23C
From 09:19:17 to now
17
18
19
80W
20S
70W
21
22
23
Current values
GIN LONGITUDE -70.72 deg (+ve E)
GIN LATITUDE -18.87 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

P19 int

http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Flight B414 14:46:09
Heading 46 deg Speed 226 knots Height 7.0kft Press 781mb
Lat 18°42.0'S Long 70°30.0'W Wind 1 ms-1/ 71 deg
Temp 14.43C Dewpoint -1.3C
From 12:30:00 to now



Current values

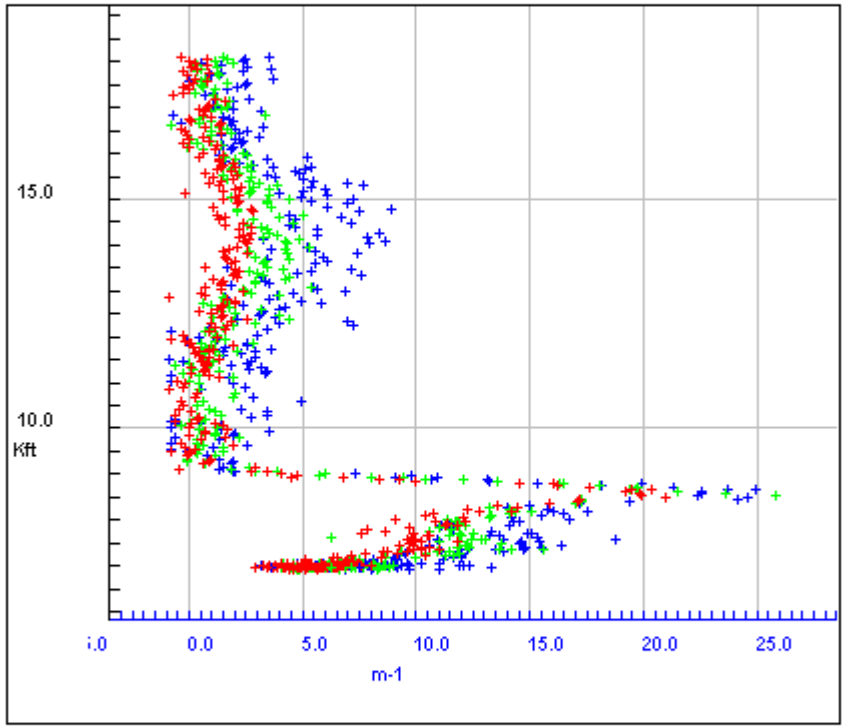
STATIC PRESSURE	781.75	mb
DEICED TRUE AIR TEMP	14.44	deg C
DEW POINT	-1.3	deg C

Applet horaceplot.plot.plotapp started

http://192.168.101.71 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Flight B414 14:46:27
Heading 47 deg Speed 230 knots Height 6.9kft Press 782mb
Lat 18°42.0'S Long 70°30.0'W Wind 1 ms-1/ 72 deg
Temp 14.22C Dewpoint -1.49C
From 14:30:00 to now

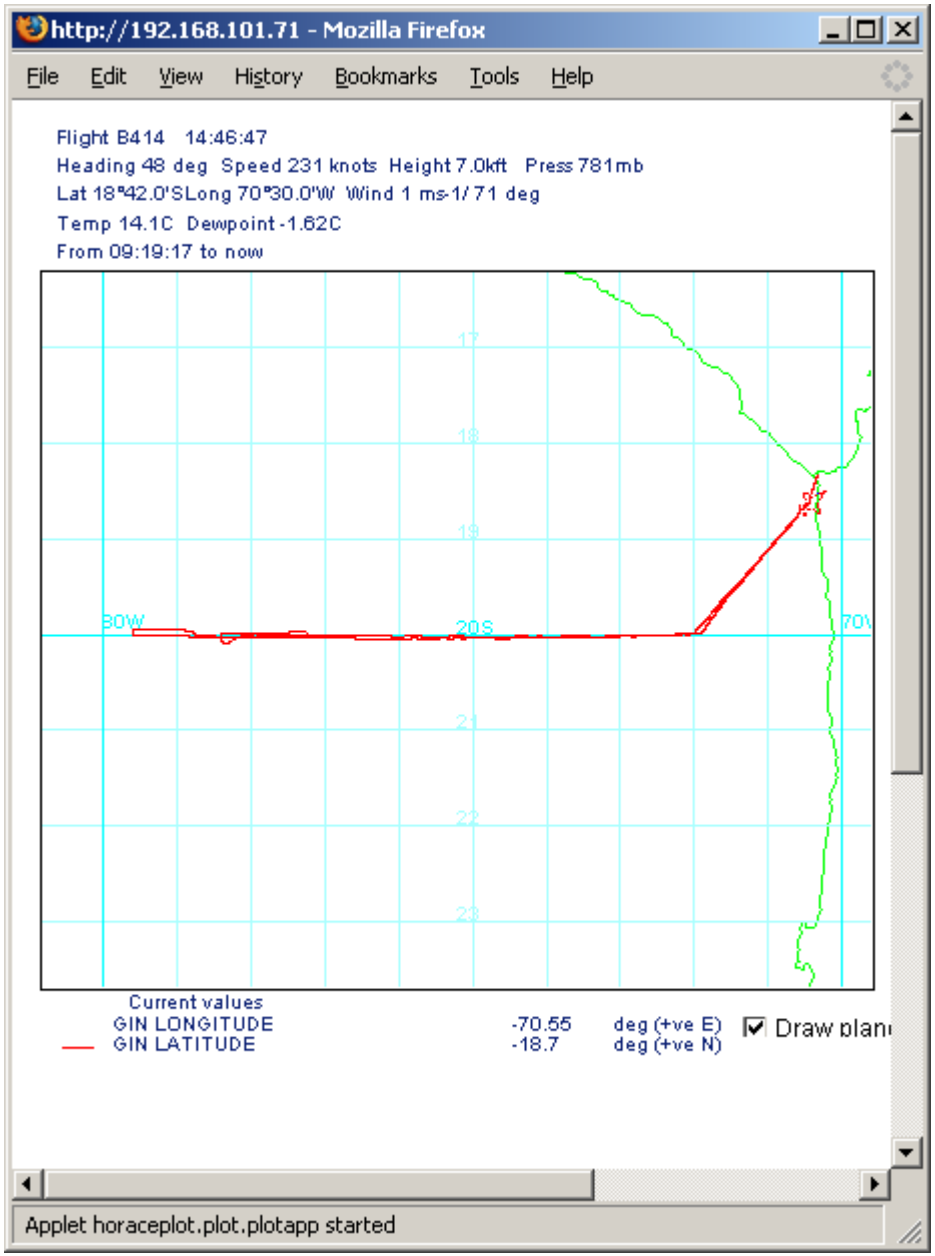


Current values

PRESSURE HEIGHT	6.98	Kft
NEPH BLUE SP	3.59	m-1
NEPH GREEN SP	7.16	m-1
NEPH RED SP	3.46	m-1

All

Applet horaceplot.plot.plotapp started


http://192.168.101.71 - Mozilla Firefox
File Edit View History Bookmarks Tools Help
Flight B414 14:46:47
Heading 48 deg Speed 231 knots Height 7.0kft Press 781mb
Lat 18°42.0'S Long 70°30.0'W Wind 1 ms-1/ 71 deg
Temp 14.1C Dewpoint -1.62C
From 09:19:17 to now
17
18
19
20S
21
22
23
80W
70W
Current values
GIN LONGITUDE -70.55 deg (+ve E)
GIN LATITUDE -18.7 deg (+ve N)
Draw plan
Applet horaceplot.plot.plotapp started

Run 4.1	11:36:44	270	0.33kft	20.0S	76.9W	11:46:49	267	0.33kft	20.0S	77.6W	
heimann	11:38:18	267	0.33kft	20.0S	77.0W						cal 09
r4.1	11:38:30	266	0.33kft	20.0S	77.1W						500ft
JW	11:38:56	266	0.34kft	20.0S	77.1W						zero check
nev	11:39:10	267	0.38kft	20.0S	77.1W						zero check
Profile 13	11:46:49	267	0.33kft	20.0S	77.6W	11:51:19	271	4.0kft	20.0S	77.9W	
Run 4.2	11:51:19	271	4.0kft	20.0S	77.9W	12:01:26	264	4.0kft	20.0S	78.6W	
p13	11:52:12	269	4.0kft	20.0S	77.9W						pop up above to check cloud top
Profile 14	12:01:27	262	4.0kft	20.0S	78.6W	12:02:35	271	4.9kft	20.0S	78.6W	
Run 4.3	12:02:36	271	4.9kft	20.0S	78.6W	12:15:09	270	4.9kft	20.0S	79.5W	
Profile 15	12:15:09	270	4.9kft	20.0S	79.5W	12:16:04	273	5.4kft	19.9S	79.5W	
Run 5.1	12:16:18	274	5.4kft	19.9S	79.5W	12:30:34	093	5.4kft	20.0S	78.8W	
r5.1	12:19:16	091	5.3kft	20.0S	79.5W						C130 run start 1 mile south of C130 track
Profile 16	12:30:35	093	5.4kft	20.0S	78.8W	12:31:57	087	4.2kft	20.0S	78.7W	
Run 5.2	12:31:57	087	4.2kft	20.0S	78.7W	12:41:46	096	4.2kft	20.0S	78.1W	
Profile 17	12:41:46	096	4.2kft	20.0S	78.1W	12:45:30	097	0.33kft	20.0S	77.9W	
Run 5.3	12:45:31	097	0.33kft	20.0S	77.9W	12:55:34	094	0.38kft	20.0S	77.3W	
r5.3	12:46:12	094	0.34kft	20.0S	77.8W						qnh 1020
Profile 18	12:56:15	047	1.1kft	20.0S	77.3W	13:16:26	058	23.0kft	20.1S	78.3W	start as end r5,3
Run 6	13:16:26	058	23.0kft	20.1S	78.3W	14:25:08	039	22.9kft	19.8S	71.7W	
Sonde 1	13:19:24	082	23.0kft	20.0S	78.0W						
Heimann	13:25:08	092	23.0kft	20.0S	77.4W						cal 06
Sonde 2	13:29:43	098	23.0kft	20.0S	77.0W						
Sonde 3	13:39:50	091	23.0kft	20.0S	76.0W						
Sonde 4	13:50:15	093	23.0kft	20.0S	75.0W						
Sonde 5	14:00:40	096	23.0kft	20.0S	74.0W						
Sonde 6	14:11:13	088	23.0kft	20.0S	73.0W						
Sonde 7	14:21:21	090	22.9kft	20.0S	72.0W						
Profile 19	14:25:08	039	22.9kft	19.8S	71.7W						
p19	14:43:09	054	7.0kft	18.9S	70.7W						interrupted fl070

Chemistry Log

Date: 04 Nov 2008 Flight: B414 Operator: Doug Anderson / Guy Gratton

Preflight

No.	? or x	Location	Action	Comments
		Gases		
1	X	CO_2 / Ar	Outlet pressure is between 2 and 2.5 bar	
2	X	CO_2 / Ar	Inlet pressure not less than 20 psi	173
3	X	Nitrogen	Outlet pressure is between 2 and 2.5 bar	
4	X	Nitrogen	Inlet pressure not less than 20 psi, note pressure	45
5	X	CO standard	Outlet pressure is between 2 and 2.5 bar	
6	X	CO standard	Inlet pressure not less than 20 psi, note pressure	24 CO time synch @ 07:35:00
		Flows		
7	X	Ozone sample flows	Flow ~ 07. LPM on both channels	
8	X	NOx sample flow	~ 1 LPM	
9	X	NOx Ozonator flow	~ 0.065 LPM	
10	X	CO lamp flow	~ 40 ml/min	
11	X	CO pressure cell	~ 7.5 bar	
12	X	CO pressure monochromator	~ 5 bar	
		Zeros		
13	X	Ozone zero	Performed OK (if not approx zero note values)	
14	X	NOx zero	Performed OK (if not approx zero note values)	
15	X	CO zero	Left for approx 10 min	08:39:02 to 09:08:16
16	X	SO_2 zero (not for most flights)	Left for approx 10 min	
		Other		
17	X	Tubing	All inlets / exhausts connected	
18	X	HORACE data	Check data is being displayed and recorded	
19	No	CO calibration	If unattended set to auto cal (40 min)	
		TDLAS		
20	n/a	230V	230V power breakers on	
21	n/a	28V	Red LED on front panel (ensure LTI breaker on)	
22	n/a	Laptop	On and software working	
23	n/a	Data	Being saved to correct directories	

Post flight

		Switch Off		
1	X	CO	Switch off instrument	
2	X	Ozone	Switch off monitor	
3	X	NOx	Switch off monitor	
4	X	Pumps	Switch off all pumps	
5	X	Breaker	Pop all breakers on rack and SSP	
		Gases (note pressures)		
6	X	CO2/Ar	Close valves and check inlet pressure not below 20 psi	175
7	X	CO standard	Close valves and check inlet pressure not below 20 psi	45
8	X	Nitrogen	Close valves and check inlet pressure not below 20 psi	15
			If below 20 psi then the cylinder needs changing refilling	
		Driers		
9	X	Small drier	Change if spent	
10	X	Large drier	Change if spent	
		TDLAS		
11	n/a	Data transfer	To memory stick	
12	n/a	Laptop	Shut down	
13	n/a	Switch off instrument	Pull all breakers IF no other instrument on	
		Log		
14	X	Flight Log	Put log in folder (notify Ruth of any issues)	
15	None	Faults	Fill out separate log for in flight issues put in flight folder	
16	n/a	TDLAS data	Send to project spaces on BADC	

Chemistry Log

Date: 04 Nov 2008 Flight: B414 Operator: Doug Anderson / Guy Gratton

In flight

CO calibrations only need carrying out when the lamp temperature changes, if unsure perform a quick cal first.

During each CO calibration check Ozone and NOx flows are similar to those observed pre-flight

Time	Flight level	CO Sensitivity (Hz/ppbV)	CO Bkgrd (ppbV)	CO Bkgrd Count (Hz)	CO Cell Pressure (Torr)	CO Lamp Temp (deg C)
08:07:11	Ground, pre power c/o	82.95	314.53	26090.17	35.51	7.52
Time	Flight level	CO Sensitivity (Hz/ppbV)	CO Bkgrd (ppbV)	CO Bkgrd Count (Hz)	CO Cell Pressure (Torr)	CO Lamp Temp (deg C)
09:18:10	Ground, pre power c/o	91.18	311.30	28384.50	40.50	7.52
Time	Flight level	CO Sensitivity (Hz/ppbV)	CO Bkgrd (ppbV)	CO Bkgrd Count (Hz)	CO Cell Pressure (Torr)	CO Lamp Temp (deg C)
09:34:40	Ground, pre power c/o	91.10	313.12	28524.00	40.54	7.54
Time	Flight level	CO Sensitivity (Hz/ppbV)	CO Bkgrd (ppbV)	CO Bkgrd Count (Hz)	CO Cell Pressure (Torr)	CO Lamp Temp (deg C)
09:41:42	Ground, during taxi	91.73	310.35	28467.83	40.53	7.53
Time	Flight level	CO Sensitivity (Hz/ppbV)	CO Bkgrd (ppbV)	CO Bkgrd Count (Hz)	CO Cell Pressure (Torr)	CO Lamp Temp (deg C)

Flight level	**Zero Start time**	**Zero End time**	**Counts (Hz)**	**Span Start time**	**Span End time**	**Conc. Range**	**Counts range**	**Pressure Cell** (Torr)	**Lamp Temp**	**O3 Intensities**
6000’	09:52:40	09:53:40	27770 - 28367	09:53:45	09:54:45	504 - 514	74583 - 75592	7.49	40.53	A: 109577 B: 131804
3000’	10:29:16	10:30:20	28028 - 28151	10:30:35	10:31:35	506 - 517	74952 - 76097	7.51	40.47	A: 96954 B: 116572
3800’	11:08:40	11:09:40	27935 - 28552	11:09:45	11:10:40	522 - 536	75800 - 76900	7.54	39.51	A: 94475 B: 113548
4000’	11:51:17	11:52:40	28045 - 28724	11:52:40	1:53:45	520 - 531		7.50	38.88	A: 93410 B: 112313
	Zero and cal valves both on between 11:52:25 and 11:52:40									
500’	12:45:30	11:46:30	27776- 28340	11:46:30	11:48:32	526 - 533		7.53	38.51	A: 93201 B: 112059
23,000	13:25:00	13:25:40	27660-28524	13:26:00	13:26:40	518-537	75990-76500	7.34	39.04	A: B:
23,000	14:05:00	14:05:40	27267-28070	14:06:00	14:06:40	507-521	75440-76527	7.36	40.50	A:94788 B:114102
8,000	14:39:00	14:39:40	27358-28100	14:40:40	14:40:40	507-515	74914-75636	7.52	40.50	A:95015 B:114350
	Just after removal of vent cap									

03 Intensity						
Time	Flight level	O3 A Intensity	O3 B Intensity			
09:42:12	Taxi	112063	134947			
09:44:15	T/o	112480	135423			
09:45:50	1000’	112680	135672			
09:47:10	?	112722	135727			
09:50:	?	112211	135072			

In flight comments

CLOUD PHYSICS LOG Flight B 414

Date: 4/11/08	Operator: MAP	DRS Time: 08:30:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 1 of 4

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		Manchester FSSP		CIP25			CDP			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Mean Dia	Conc m3	Max size	LWC	Conc m3	Mean Dia	LWC		
09:46:49	6400	0.07	2														FL020
09:47:45	3400	0.07	58														FL030
09:49:16	900	0.07															FL040
09:50:25	1000	0.07															FL050
09:51:30	400	0.07															End of Profile 1 & Start Run 1 @ FL060
09:52:00	410	0.07															
09:54:00	500	0.07															
09:56:00	450	0.08															
09:58:00	430	0.06															
10:00:00	330	0.07															
10:02:00	500	0.07															
10:03:40	460	0.07															End of Run & Start Profile 2
10:04:38	680	0.07	59														FL050
10:05:35	900	0.07															FL040
10:06:30	1000	0.07															FL030
10:07:40	3500	0.07	85														FL020
10:08:33	4800	0.07															FL010
10:09:28	2600	0.07															End of Profile 2 & Start Profile 3 @ 50’
10:11:30	2300	0.07															End of Profile 3 & Start Run 2.1 @ 500’
10:12:00	2300	0.07															
10:14:00	2100	0.07															
10:16:00	2500	0.07															
10:18:00	2000	0.07															
10:20:00	1900	0.07															
10:22:39																	End of Run 2.1 & Start Profile 4
10:22:19	1900	0.07															FL010
10:22:36																	End of Profile 4 & Start Run 2.2 @ 1500’
10:23:00	2000	0.07															
10:25:00	1900	0.07															
10:27:20																	End of Run & Start Profile 5
10:28:50																	End of Profile 5 & Start Run 2.3 @ FL029
10:29:00	1100	0.19	237			5	100	350	14			0.25	175	13	0.2	12	
10:31:00	400	0.15	353			2	100	300	10			0.15	150	10	0.1	12	
10:33:00	2000	0.07															
10:34:17																	End of Run & Start Profile 6
10:35:34	980																FL040
10:36:21			Fail														End of Profile 6 & Start Run 2.4 @ FL049
10:39:00	800	0.07															
10:41:00	500	0.07															
10:43:00	500	0.07															
10:45:00	550	0.07															
10:46:49																	End of Run & Start Profile 7
10:47:56	600	0.11															FL040

PCASP Reference Volts = 7V	FFSSP Reference Volts = 3.2V	2D2-C End element 1 voltage = -2.0V	CIP25 End element 1 voltage = 0.7V	CIP100 End element 1 voltage = n/a
PCASP Flow rate = 0.6 CC/sec		2D2-C End element 32 voltage = -2.5V	CIP25 End element 64 voltage = 0.6V	CIP100 End element 64 voltage = n/a
	SID2 Laser power = n/a	2D2-P End element 1 voltage = n/a		

CLOUD PHYSICS LOG Flight B 414

Date: 4/11/08	Operator: MAP	DRS Time: 08:30:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 2 of 4

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		Manchester FSSP		CIP25			CDP			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Mean Dia	Conc m3	Max size	LWC	Conc m3	Mean Dia	LWC		
10:49:00	700	0.18	121			6		400	18			0.7	125	15	0.17		FL030
10:50:15	2000	0.07	124														FL020
10:51:25	2300	0.07															FL010
10:53:44	2700	0.07															End of P7 & Start P8 from 50’
10:54:35																	End of P8 @ 500’ & Start Run 3.1 @ 500’
10:55:00	3600	0.07															
10:57:00	3000	0.07															
10:59:00	3000	0.07															
11:01:00	2800	0.07	125														
11:03:00	3100	0.07															
11:04:39																	End of Run & Start Profile 9
11:05:33	3450	0.07															FL010
11:06:40	3200	0.07															FL020
11:07:12	3100	0.07															FL030
11:07:56																	End of Profile & Start Run 3.2 @ 3600’
11:08:00	1800	0.18	Fail			2	100	400	10			0.1	250	12	0.2	12	
11:12:00	1400	0.09	232			2		500	12			0.05	200	11	0.1	12	
11:14:00	1200	0.12	240			2		400	12			0.05	225	11	0.15	12	
11:16:00	1300	0.09	500			1	75	500	11			0.05	250	11	0.15	12	
11:18:18																	End of Run & Start P10
11:18:59	1000	0.09	713														FL040
11:19:44																	End of P10 & Start Run 3.3 @ FL044
11:20:00	500	0.08															
11:22:00	200	0.06															
11:24:00	220	0.07															
11:26:00	230	0.07															
11:28:00	290	0.07															
11:30:03																	End of Run Start Profile 11
11:30:44	1300	0.09	727			1		400	10				125	11	0.06	12	FL040
11:32:47	2300	0.09	754														FL020
11:33:51	2400	0.08															FL010
11:35:59	3000	0.07															End of Profile 11 & Start Profile 12 @ 50’
11:36:44																	End of P12 & Start Run 4.1 @ 500
11:37:00	2800	0.07															
11:39:00	2600	0.07															
11:41:00	2600	0.07															
11:43:00	2600	0.07															
11:45:00	2500	0.07															
11:46:47																	End of Run 4.1 & Start P13
11:47:38	2400	0.07															FL010
11:48:34	2300	0.07															FL020
11:49:25	2230	0.07															FL030
11:50:17																	End of P13 & Start Run 4.2 @ 4100’

PCASP Reference Volts = 7V	FFSSP Reference Volts = 3.2V	2D2-C End element 1 voltage = -2.0V	CIP25 End element 1 voltage = 0.7V	CIP100 End element 1 voltage = n/a
PCASP Flow rate = 0.6 CC/sec		2D2-C End element 32 voltage = -2.5V	CIP25 End element 64 voltage = 0.6V	CIP100 End element 64 voltage = n/a
	SID2 Laser power = n/a	2D2-P End element 1 voltage = n/a		

CLOUD PHYSICS LOG Flight B 414

Date: 4/11/08	Operator: MAP	DRS Time: 08:30:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 3 of 4

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		Manchester FSSP		CIP25			CDP			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Mean Dia	Conc m3	Max size	LWC	Conc m3	Mean Dia	LWC		
11:52:00	2100	0.19	876			4	125	250	15			0.15	160	15	0.2	12	
11:54:00	1900	0.14	1060			3	100	350	14			0.15	160	15	0.2	12	
11:56:00	2400	0.16	1239			3	250	350	15			0.25	160	15	0.2	12	
11:58:00	5400	0.12	1415			2	100	300	15			0.25	160	15	0.3	12	
12:00:00	3000	0.17	1572			1		300	15			0.25	160	15	0.25	12	
12:01:26																	End of Run & Start Profile 14
12:02:34																	End of Profile 5000’ & Start Run 4.3
12:03:00	800	0.06	1726														
12:04:00	540	0.07															
12:06:00	750	0.07															
12:08:00	610	0.07															
12:10:00	500	0.07															
12:12:00	300	0.07															
12:14:00	340	0.07															
12:15:10																	End of Run 4.3 & Start Profile 15
12:15:44																	End of P 15 & Start Run 5.1
12:18:00	260	0.07															
12:20:00	360	0.07															
12:22:00	270	0.07	1727														
12:24:00	220	0.07															
12:26:00	350	0.07															
12:28:00	500	0.07															
12:30:00	140	0.10															
12:30:36																	End of Run & Start Profile 16
12:31:57																	End of Profile 16 & Start Run 5.2 @ FL041
12:32:00	1200	0.20	1802			4	125	200	18			0.4	125	17	0.4	12	
12:34:00	2800	0.20	1899			8	200	100	18			0.4	150	20	0.4	1	
12:36:00	4700	0.19	2120			2	100	200	18			0.25	150	17	0.4	12	
12:38:00	4400	0.17	2300			2	100	250	18			0.3	150	20	0.5	12	
12:40:00	5400	0.15	2478			2	150	250	18			0.2	150	17	0.4	12	
12:41:45																	End of Run 5.2 & Start Profile 17
12:42:53	3600	0.06	2707														FL030
12:43:50	4000	0.07															FL020
12:44:59	3900	0.06															FL010
12:45:31																	End of P17 & Start Run 5.3 @ 500’
12:46:00	3700	0.06															
12:48:00	3500	0.07															
12:50:00	3600	0.07															
12:52:00	3200	0.07															
12:54:00	3040	0.07															
12:55:34																	End of Run 5.4 & Start P18
12:56:26	2500	0.07															FL010
12:57:00	2400	0.07															FL020

PCASP Reference Volts = 7V	FFSSP Reference Volts = 3.2V	2D2-C End element 1 voltage = -2.0V	CIP25 End element 1 voltage = 0.7V	CIP100 End element 1 voltage = n/a
PCASP Flow rate = 0.6 CC/sec		2D2-C End element 32 voltage = -2.5V	CIP25 End element 64 voltage = 0.6V	CIP100 End element 64 voltage = n/a
	SID2 Laser power = n/a	2D2-P End element 1 voltage = n/a		

CLOUD PHYSICS LOG Flight B 414

Date: 4/11/08	Operator: MAP	DRS Time: 08:30:00	DAU1 Time: +0	DAU2 Time: +0	DAU3 Time: +0	Aux1 Time: +0	Aux2 Time: +0	Page 4 of 4

G.M.T	PCASP		FFSSP	SID1	SID2	2D2-C		Manchester FSSP		CIP25			CDP			Habit	Remarks
	Conc/cc	Mean R	Block TX	Count	Count	Conc/L	Max size	Conc/m3	Mean Dia	Conc m3	Max size	LWC	Conc m3	Mean Dia	LWC		
12:57:53	2000	0.07	2708														FL030
12:58:50	2600	0.11	2776			5	100	500	19			0.3	200	18	0.5	11	FL040
13:00:06	340	0.07															FL050
13:01:02	230	0.07															FL060
13:06:01	100	0.07															FL110
13:06:57	90	0.07															FL120
13:07:59	60	0.07															FL130
13:09:30	70	0.06															FL150
13:11:04	100	0.07															FL170
13:11:56	80	0.06															FL180
13:13:47	70	0.06															FL200
13:14:47	80	0.06															FL210
13:15:39	140	0.06															FL220
13:16:26																	End of Profile & Start Run 6 @ FL230
13:17:00	70	0.06															
13:19:00	90	0.06															
13:21:00	80	0.06															
13:23:00	60	0.06															
13:25:00	90	0.06															
13:27:00	110	0.06															
13:29:00	Noise	0.06															
13:31:00	Noise																
13:35:00	Noise																
13:40:00	Noise																
13:45:00	Noise																
13:50:00	Noise																
13:55:00	Noise																
14:00:00	Noise																
14:10:00	Noise																
14:20:00	Noise																
14:25:08																	Start Profile 19 from FL230
14:27:51	Noise																FL200
14:33:25	Noise		2777														FL150
14:38:25	Noise																FL100
14:52:40	Noise																FL050
	PCASP Data Very suspect due to leak. Noise at end of Flight probably due to low Vref caused by dirty optics from leak.																

PCASP Reference Volts = 7V	FFSSP Reference Volts = 3.2V	2D2-C End element 1 voltage = -2.0V	CIP25 End element 1 voltage = 0.7V	CIP100 End element 1 voltage = n/a
PCASP Flow rate = 0.6 CC/sec		2D2-C End element 32 voltage = -2.5V	CIP25 End element 64 voltage = 0.6V	CIP100 End element 64 voltage = n/a
	SID2 Laser power = n/a	2D2-P End element 1 voltage = n/a		

FAAM Dropsonde Flight Log

Flight No.	B414	**Date**	04 Nov 2008	**Operator**	Doug Anderson	**Page No.**	1 of 1

GMT	**Sonde No.**	**Event** *eg land, splashdown*	**Comments** *pressure hPa, T deg C, RH %, wind direction deg, wind speed m/s, **longitude, latitude**, height m*
13:19:33	1	Launch	409.80 -15.30 4.13 271.80 17.70 0.40 **-77.983600 -19.999600** 7014.10
13:28:31	1	Splashdown	1018.09 16.76 64.32 147.75 3.95 -12.49 **-77.961202 -20.005088** 99999.00
13:29:45	2	Launch	409.40 -15.50 3.46 267.90 16.50 0.90 **-76.984000 -20.009700** 7020.20
13:38:55	2	Splashdown	1018.12 16.31 58.61 143.72 4.38 -7.50 **-76.948449 -20.019404** 99999.00
			End of drop time override : 549.9
13:39:51	3	Launch	410.40 -15.30 3.40 269.40 15.40 0.60 **-75.995400 -20.022800** 7002.80
13:48:56	3	Splashdown	1018.21 16.15 60.14 129.38 4.86 -11.09 **-75.955453 -20.037353** 99999.00
13:50:18	4	Launch	409.50 -15.40 3.39 268.60 13.90 0.60 **-74.992500 -20.024400** 7018.90
13:59:20	4	Splashdown	1017.63 16.26 61.65 139.98 4.10 -9.68 **-74.955456 -20.040217** 99999.00
14:00:45	5	Launch	410.10 -15.10 3.67 265.30 13.60 0.60 **-73.987900 -20.025500** 7008.30
14:10:00	5	Splashdown	1016.98 16.51 63.41 162.49 5.53 -9.43 **-73.954019 -20.042548** 99999.00
14:11:15	6	Launch	410.70 -15.60 3.95 269.30 13.20 0.60 **-72.975900 -20.009700** 6997.80
14:20:17	6	Splashdown	1016.32 16.67 70.05 170.48 4.47 -9.56 **-72.942414 -20.025349** 99999.00
			End of drop time override : 542.5
14:21:24	7	Launch	411.60 -15.60 3.86 275.00 11.80 0.60 **-71.998800 -19.998400** 6983.30
14:30:43	7	Splashdown	1015.99 17.07 77.24 176.83 4.52 -10.18 **-71.969260 -20.012083** 99999.00

P.S.A.P. Log

Flight No. **B414** Date 4/11/2008

GMT	Filter Trans.	Flow Rate	B_a x 10^{-6}	Ph_det levels		Run	Remarks
Set to DRS time: done 074920Z	New filter Tr = 1.000 done	Set to 3.0 lpm: N/A				Ave =30 s	←Preflight
100630	.999		.0	16	43		pump off
100722	.996		49.9	16	43		pump on
104710	.993		.0	16	43		pump off
104945	.991		12.6	16	43		pump on
110705	.986		.0	16	43		pump off
112700	.997		.0	16	43		pump on
113016	.997		2.4	16	43		pump off
113150	.987		24.9	16	43		pump on
114948	.982		.0	16	43		pump off
120202	.983		.0	16	43		pump on
123140	.995		.0	16	43		pump off
124250	.980		8.8	16	43		pump on
125845	.976		.0	16	43		pump off
125926	.978		.0	16	43		pump on

Flight No: B414 **Date: 04/11/2008** **Operator:DAT**

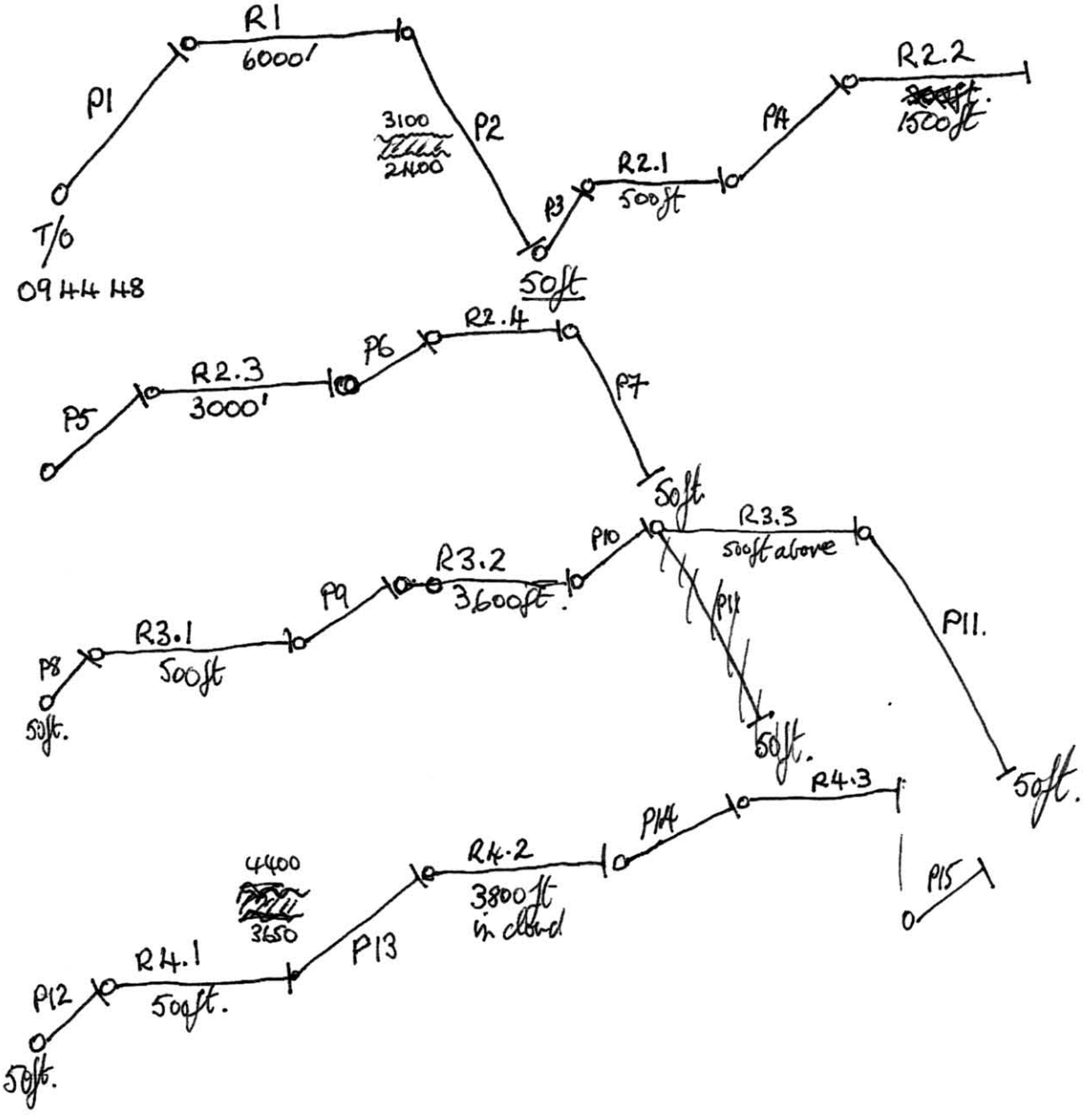
Type of filters mounted in	Upper inlet:	Lower inlet:

Disk No 1 (top)	Disk No 2 (middle)	Disk No 3 (bottom)	Inlet Upper/ Lower	Time Pump On	Time Pump Off	Run	Accum Vol [l]	Comments eg. Filter Exposure No, period in cloud, change of level etc.
1	2		L	101301	102135	R2.1	567	500ft
1	2		L	105508	110430	R3.1	559	500ft
3	4		L	103728	114643	R4.1	562	500ft
3	4		L	124640	125534	R5.3	597	500ft
10	69		L	123347	123922	R5.2	blank	4200ft

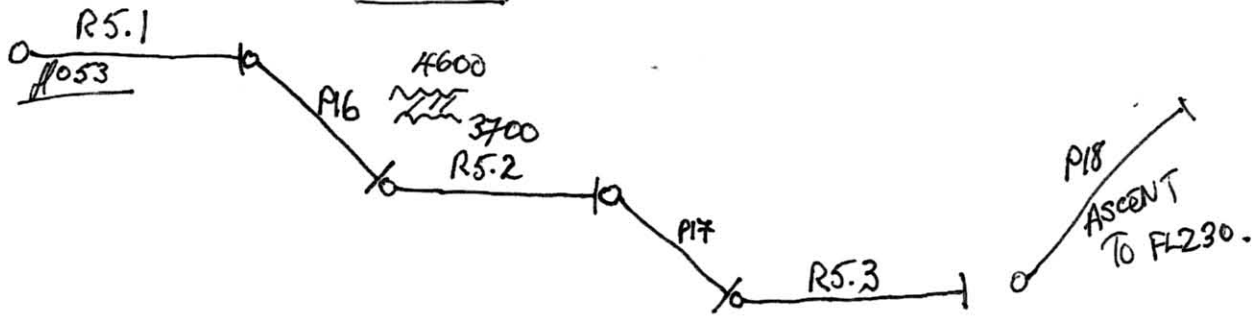
Size	#	charged	Flight/date	discharged	Comments.
10	1	3/11	B414/	4/11	
1	2	ICNB	4/11		
10	3	3/11	B414	4/11	
1	4	ICNB	4/11		
10	7	3/11	~~NOT USED~~	~~XXX~~	
1	8	ICNB	4/11		
10	10	3/11	B414	4/11	← put hole in foil, with tweezers at discharge
1	69	ICNB	4/11		
10	21	3/11	NOT USED	—	(Clean glove touched foil surface on 21 3/11)
1	23	ICNB	4/11		
10	33	3/11	NOT USED	—	
1	40	ICNB	4/11		

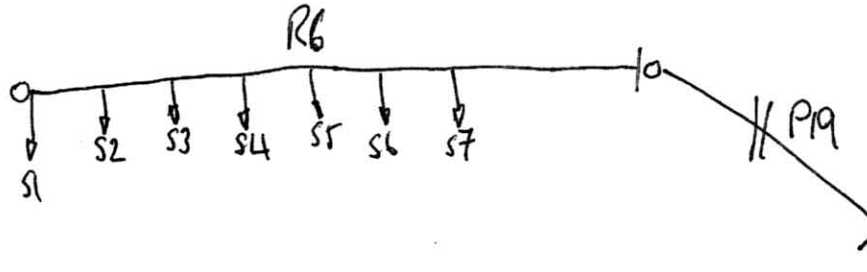
Filter #	Loc'n	T_{ON}	T_{OFF}	Run	Vol.	Tot
1, 2	L	101301	102135	R2.1	567	-
~~1, 2~~	L	105508	110430	R3.1	559	1126
10, 69	L	123347	123922	R5.2	Blank	0
3, 4	L	103728	114643	R4.1	562	-
	L	124640	125534	R5.3	597	1159

B414



C130 intercomparison run





Land

~~0053~~ 15:04:04

Flight: B414

KEY

- Not Fitted
- Fitted, Not Operated
- Duff Data
- Minor Problem
- OK

Thermometers
- Cabin Temperature:
- Heimann:
- Deiced Temp:
- Non-deiced Temp:

Hygrometers
- FWVS:
- Buck CR2:
- General Eastern:
- Johnson Williams:
- Nevzorov:
- Total Water Probe:

Cameras
- Downward Facing:
- Forward Facing:
- Rearward Facing:
- Upward Facing:

Navigation + Aircraft
- Cruciform GPS:
- GIN Applanix:
- INU Honeywell:
- Radar Altimeter:
- RVSM IAS:
- RVSM Static Pressure:
- XR5 GPS:

Misc Core
- HORACE:
- AMTG:
- AVAPS:
- Cabin Pressure:
- Printer:
- S9 Static Pressure:
- Satcom C:
- Satcom H (VIRC):
- Turb Centre-Static:
- Turb Left Right:
- Turb Up-Down:
- Turb Horizontal Chk:
- Turb Vertical Chk:
- Weather Radar:

DLUs:
- DLU AERACK:
- DLU BBR Lower:
- DLU BBR Upper:
- DLU Core Chem:
- DLU Core Consoles:
- DLU Port Aft:
- DLU Port Fwd:
- DLU Stbd Fwd:

Radiometers
Lower:
- BBR (clear) Lower:
- BBR (IR) Lower:
- BBR (red) Lower:

Upper:
- BBR (clear) Upper:
- BBR (IR) Upper:
- BBR (red) Upper:

- ARIES:
- DEIMOS:
- IR Camera:
- JNO2 Lower:
- JNO2 Upper:
- JO1D Lower:
- JO1D Upper:
- MARSS:
- SHIMS Lower:
- SHIMS Upper:
- SWS:
- TAFTS:

Cloud Probes
- 2DC:
- 2DP:
- FFSSP:
- PCASP:
- PCASP SPP-200:
- 2DS:
- ADA:
- CAPS:
- CCN:
- CDP (fuselage):
- CDP (Canister):
- CIP 100 (PIP):
- CIP 25 (CIP):
- CPI:
- CVI (Inlet):
- CVI PCASP-X:
- CVI Ly-A Hygro
- FSSP (UMan):
- SID1:
- SID2:
- SID3:

Aerosol
- CPC 3025A:
- CPC 3786 H2O:
- Filters 47mm:
- Filters 90mm:
- Neph - Dry:
- Neph - Wet:
- PSAP:
- AMS:
- CPC (AMS):
- SMPS (AMS):
- CPC 3010A (CVI):
- INC:
- Mini-LIDAR:
- SP2:
- UHSAS:
- VACC:

Chemistry
- CO Aerolaser 5002:
- NOx TE42C:
- Ozone TE49C:
- Ozone TE49:
- SO2 TE43C:
- TDLAS (NIR) CH4:
- TDLAS (NIR) CO2:
- FAGE:
- Formaldehyde:
- NOx FAAM:
- NOxy:
- ORAC:
- PAN:
- PERCA:
- Peroxide:
- PTRMS:
- TDLAS (1C):
- WAS Bags:
- WAS Bottles:

Misc Non-Core
- CASI/ATM:
- LIDAR (big):
- LTI:
- SAW Hygrometer:

Report Created 15/09/2009 14:23:23

Last Updated: 21/11/2008 13:24:48

Faults / Incidents Log

Flight No. B414
Date: 04/11/08

Instruments

RFC	condensation running on inside of window, avalon informed
Filters	ok
Dropsondes	7 dropped, all ok & satcommed
CVI -	ok
Neph –PSAP – wetNeph	ok
AMS	ok
Core Chem -	ok
Cloud physics -	PCASP – leak near inlet jet?
ARIES -	ok
MARSS -	ok
SWS -	ok
SHIMS	upper ok, lower intermittant
CCN -	single channel only, data recording started late due pc problems. Shut down early in profile to fl230
VACC -	ok
2DS -	ok
CAPS -	ok
SMPS -	ok
Buck -	experimental operation

Aircraft

ISDN Emails

MPDS
Run for flight

Satcom-H Calls
nil

Issues

CVI log

11/4/08 9:52:20 AM lyman zero and back to sample
11/4/08 9:53:21 AM aerosol mode.
11/4/08 10:06:42 AM cloud
11/4/08 10:07:05 AM aerosol mode for transition (10sec)
11/4/08 10:22:10 AM cf of ready for 1500 ft set up
11/4/08 10:22:15 AM cf of ready for 1500 ft set up
11/4/08 10:23:29 AM ams on
11/4/08 10:23:39 AM
11/4/08 10:24:30 AM
11/4/08 10:25:25 AM
11/4/08 10:26:44 AM
11/4/08 10:27:28 AM CVI set for just above zero
11/4/08 10:28:23 AM ams flow set at 0.5 cf cntl 0.7 flow diff .2lpm
11/4/08 10:28:27 AM ams flow set at 0.5 cf cntl 0.7 flow diff .2lpm
11/4/08 10:28:39 AM cloud
11/4/08 10:32:19 AM cf down to 0.5 to increase water content
11/4/08 10:32:53 AM out of cloud
11/4/08 10:36:05 AM Above cloud run. Aerosol mode.
11/4/08 10:45:39 AM AMS still samplinf of CVI in aerosol mode for the first above cloud run
11/4/08 10:46:22 AM dial for ams at zero as didn't know AMS was sampling.
11/4/08 10:46:52 AM AMS going back to rosemount for profile down
11/4/08 10:48:15 AM cloud
11/4/08 10:49:26 AM out of cloud base
11/4/08 11:04:38 AM cf mode for cloud run
11/4/08 11:05:01 AM AMS on cvi
11/4/08 11:05:07 AM AMS on cvi
11/4/08 11:06:34 AM AMS on cvi
11/4/08 11:07:26 AM ams flow dial to .49 cf cntl at 0,5 diff =0.1
11/4/08 11:11:44 AM ams flow dial to .49 cf cntl at 0,5 diff =0.1
11/4/08 11:12:38 AM ams flow dial to .49 cf cntl at 0,5 diff =0.1
11/4/08 11:13:09 AM ams flow dial to .48 cf cntl at 0,4 diff =0.05 to .1
11/4/08 11:13:56 AM
11/4/08 11:14:09 AM ams dial to 0.4lpm
11/4/08 11:15:48 AM ams dial to 0.3lpm
11/4/08 11:16:11 AM ams dial to 0.3lpm
11/4/08 11:20:25 AM Aerosol mode
11/4/08 11:34:02 AM aerosol mode for decent.
11/4/08 11:47:20 AM cf on ready for cloud run
11/4/08 11:48:15 AM AMS switching to cvi, use 0.3lpm and cf cntl=0.4
11/4/08 11:50:05 AM cf diff =0.8 to 0.1 slight noice on zero.
11/4/08 11:55:09 AM hygro dilution to 0.2
11/4/08 11:56:32 AM hygro dilution to 0.3
11/4/08 11:56:56 AM hygro dilution to 0.3
11/4/08 11:57:10 AM Cf to 0.1 control
11/4/08 11:57:19 AM Cf to 0.1 control
11/4/08 11:57:53 AM cf dif 0.01 to 0.05
11/4/08 12:01:23 PM hygro shows no difference to new cf cntrol or dillution factor.
11/4/08 12:02:30 PM above cloud ams to rose mounts
11/4/08 12:02:50 PM aerosol mode
11/4/08 12:20:52 PM PCASP flow tweeked up.
11/4/08 12:27:58 PM cf mode on
11/4/08 12:29:06 PM cf mode on NOams, still good zero with control at 0.1
11/4/08 12:29:44 PM CVI onlone, cf diffs of 0.02
11/4/08 12:31:36 PM AMS to CVI
11/4/08 12:31:44 PM in cloud
11/4/08 12:42:44 PM out of cloud base,AMS to rosemounts.
11/4/08 12:43:53 PM aerosol mode
11/4/08 12:56:11 PM climbing for sondes at 23000. Aerosol mode left on.
11/4/08 12:58:30 PM cloud
11/4/08 3:11:09 PM hygro to zero sample (not zero'ed)

ARIES flight log

Flight: B414 **page** 1 of 2

Date: 04/Nov/2008 **Operator(s):** S. Rogers **Res:** 1 **Gain A:** 2 **B:** 2

Loc./Notes:

***Scans:** either "[IGMs]X[co-adds]", or "[stop DRS time]" if in start/stop, or "[macro name]". **View:** mirror angle.*

DRS time	Flt ptrn	Scans	View	Shtr	HBB	CBB	Comments
~08 00	Power on.						
08 01	—		CH	C	71	37	Cold Hot 1 min. Script CBBs overran?
08 32 45	—		CH	C	71	31	Cold Hot 1 min
09 45	TAKE OFF						
09 51	6000ft		Z	O	71	31	Zenith Long Run 3 min script Ci above
09 59 30			N	C	71	31	Nadir Long Run 30 sec 7/8 SCu below
10 03 75	P↓			C	71	31	6000 ft → 50 ft
10 11 27	R2.1 500ft		NZ	O	71	31	Nad Zen Long Run 30 sec (1)
10 21				O	71	31	Banking
10 21 38	P↑			O	71	31	
10 22 36	R2.2 1500ft			O	71	31	
10 27 20	P↑			C	71	30	End of script (1)
10 36 20	R2.4 5000		NZ	O	71	31	Zenith Long Run 3 min Cloud above Some Ci
10 46 28		60 x 1	N	C	71	31	Nadir Profile start nominal
10 46 50	P↓						
10 47 17			CH	C	71	31	Cold Hot 1 min
10 54 40	R3.1 500ft		NZ	O	71	31	Nad Zen Long Run 30 sec End 11:04
10 04 39	P↑		—	C	71	31	500ft → 3800 ft
11 19 30	500ft above cloud		Z	O	71	31	[redacted] Zen Long 3 min. Ci + more above
11 28 00			N	C	71	31	Nadir Long Run 3 min Broken cloud below.
11 30 00	↓			C	71	31	
11 30 43			CH	C	71	31	Cold Hot 1 min
11 36 44	500ft		NZ	O	71	31	Nad Zen Long Run 30 sec.
11 46 49	P↑		—	C	71	31	—
12 01 56	5000ft		Z	O	71	31	Zenith Long Run 3 min Above 8/8 SCu Below Ci etc.
12 14			N	O	71	31	Nadir Long Run 3 min
12 15 56			Z	O	71	31	Zenith Long Run 3 min Turn below Z!
12 21 33			N	O	71	30	Nadir Long Run 3 min Ci above 8/8 SCu below
12 25 42			Z	O	70	30	Zenith Long Run 3 min
12 30	End ↓		—	C	71	31	
12 45 10	↓ R3.3 500ft		NZ	O	71	31	Nad Zen Long Run 30 sec.

ARIES flight log

Flight: B414 | **page** 2 of 2

Date: | **Operator(s):** | **Res:** | **Gain A:** **B:**

Loc./Notes:

Scans: *either "[IGMs]X[co-adds]", or "[stop DRS time]" if in start/stop, or "[macro name]".* ***View:*** *mirror angle.*

DRS time	Flt ptrn	Scans	View	Shtr	HBB	CBB	Comments
12 55 34	↑ 500ft		—	C	71	31	500ft → FL230
12 57							ARIES has locked up - VIS very slow
							Disconnected. Reconnecting resulted in
							"Unable to open board!"
13 04							Restarting system — OK.
13 13 05	↑		Z	O	71	31	Zenith Long Run 3 min. Still climbing
							at start with some turning @ FL190
13 16 28	At FL230			O	71	31	-
13 21 34	"		N	C	71	31	Nadir Long Run 3 min
13 29 10	"		Z	O	71	30	Zenith Long Run 3 min Sonde 2 drop during Ho
13 32 10	"		N	O	71	31	Nadir Long Run 3 min
13 38 25	"		Z	O	71	31	Zenith Long Run 3 min Sonde 3
							Something's not right... Lose a/3 beams, more for CBB!
13 42	"		N	O	71	30	Nadir Long Run 3 min
13 48 19	"		Z	O	71	31	Zenith Long Run 3 min Sonde 4
13 51 41	"		N	O	71	31	Nadir Long Run 3 min.
13 58 21	"		Z	O	71	31	Zenith Long Run 3 min Sonde 5
14 01 58	"		N	O	71	31	Nadir Long Run 3 min
14 08 30	"		Z	O	71	30	Zenith Long Run 3 min Sonde 6
14 12 40	"		N	O	71	31	Nadir Long Run 3 min Cloud below breaking up ~14:15
14 19 36	"		Z	O	71	31	Zenith Long Run 3 min Sonde 7
14 25 08	↓		—				

Microwave Radiometers FLIGHT LOG	Date	4/11/08	Flight	B414	log pages	
Operator(s)	Jeff Norwood-Brown		Campaign	VOCALS		
Departure			Arrival			

System start

MARSS

Visual pod inspection						•
Close 3 SSP circuit breakers						•
Close all MARSS circuit breakers						•
FERA on				at time	0752	
Temperature controller initial temps	Ch16	21.3°C	Ch 17	21.4°C	Ch18 -20	20.2°C
Temperature controller set points		54°C		58°C		40°C
MARSS CPU on				at time	0753	
Initial target temperatures	Hot	292.3		Cold	291.5	
Target heating						•
*** CHECK SCAN HEAD CLEAR ***						•
Scanning on (LMD box)				at time	0757	
Scan indication		Monitor	•		Visual	•

Deimos

Close all Deimos circuit breakers						
Turn on Deimos CPU						
*** CHECK SCAN HEAD CLEAR ***						
Start Deimos Software				at time		
Initial target temperatures	Hot			Cold		
Target heating						
Scan indication		Monitor			Visual	
Weather	Cloud			Precip		
	Surface			Pressure		
	Other					

System functionality check

(after initial system warmup, approx 1 hour)

PC to DRS Time error		$t_{PC}=t_{DRS}$ +	0	at time		
Brightness temps 'sensible'						•
Target temps	MARSS:	Hot	344.57	Cold	292.71	
	Deimos:	Hot		Cold		

Channel gains 'sensible'	Ch1 A (-)	Ch3 A (-)	Ch1 B (-)	Ch3 B (-)	
	Ch16 (40-44)	Ch17 (45-49)	Ch18 (40-44)	Ch19 (40-44)	Ch20 (44-48)

Power changeover

Headset on before start						•
Listen to engine start sequence	4, 3, 2, 1.					•
LMD off (3 switches, bottom to top)						•
Exit Deimos Software (x)						
POWER CHANGEOVER						
LMD on (3 switches, top to bottom)	then pushbutton					•
Restart Deimos Software						
System running again					at time	

Flight #	B414	Date	4/11/08	Operator(s)	JNB	log page	2	of	2

Time	Run id	Alt/FL	*Remarks*	Sys
0840			Happy that all is well. Switching off MARSS pod until needed.	
0915			MARSS pod back on	
0925			T/O will be start of profile 1	
094448	**P1↑**	**0**	Start of profile under presumably 8/8 Sc5 though it's very dark and hard to tell.	
094658	**P1↑**	**FL020**	Into cloud	
094748	**P1↑**	**FL028**	Above 8/8 Sc5 3/8 Ac3 above and 4/8 Ci1 above that	
095120	**1**	**FL060**	Above mist (8/8 thin St1) layer but SC5 edge now behind us. 4/8 Ac3 above with 5/8 Ci1 above that	
095738	**1**	**FL060**	Back above 7/8 SC5 layer	
100334	**P2↓**	**FL060**	Start of profile descent to 50ft. Above 7/8 Sc5 below 4/8 Ac3 and 3/8 Ci1	
100644	**P2↓**	**FL031**	Entered Sc5 layer	
100720	**P2↓**	**FL024**	Below Sc5 though further 2/8 St7 (or St Fractus as drizzle noted by Cptn) at around FL011	
101028	**P3↑**	**50ft**	Start of profile to FL005	
101130	**2**	**FL005**	Start or run below 2/8 St7 and 8/8 Sc5	
102138	**P4↑**	**FL005**	Start of profile climb below 7/8 Sc5	
102236	**2.2**	**FL015**	Start of run below 7/8 Sc5 heading W along 20th S parallel	
102720	**P5↑**	**FL015**	Profile climb up to FL030 into 8/8 Sc5 layer for in cloud run	
102850	**2.3**	**FL030**	Start of in cloud run	
103416	**P6↑**	**FL030**	Start of profile climb to FL050	
103620	**2.4**	**FL050**	Start of above cloud run. 8/8 Sc5 below 1/8 Ac3 and 6/8 Ci1	
1045	**2.4**	**FL050**	Ci is Ci2 in places so 4/8 Ci1 2/8 Ci2	
104650	**P7↓**	**FL050**	Profile descent to 50ft – no change in cloud amounts or type	
104809	**P7↓**	**FL041**	Into 8/8 Sc5	
104944	**P7↓**	**FL025**	Below 8/8 Sc5 no sign of St7 (or St6 fractus) this far out (73^{o} 54.0'W)	
105346	**P8↑**	**50ft**	Profile climb to FL005	
105436	**3.1**	**FL005**	Start of run below 8/8 Sc5	
110154	**3.1**	**FL005**	Layer now 7/8 Sc5 above	
110439	**P9↑**	**FL005**	Start of profile climb to FL038	
110752	**3.2**	**FL038**	Start of run in cloud tops	
110830	**3.2**	**FL036**	Run reset to FL036 in order to be in cloud middles	
111812	**P10↑**	**FL036**	Start of profile to – 8/8 Sc5 below 4/8 Ci2 2/8 Ci1	
111920	**3.3**	**FL045**	Start or above cloud run clouds remain as above	
1126	**3.3**	**FL045**	Sc5 layer now 7/8	
113002	**P11↓**	**FL045**	Start of profile to 50ft	
113102	**P11↓**	**FL038**	Into 7/8 Sc5 layer	
113155	**P11↓**	**FL030**	Below 7/8 Sc5	
113600	**P12↑**	**50ft**	Start of profile to FL005	

Flight #	B414	Date	4/11/08	Operator(s)	JNB	log page	3	of	3

Time	Run id	Alt/FL	*Remarks*	Sys
113644	**4.1**	**FL005**	Start of run below 7/8 Sc5	
1142	**4.1**	**FL005**	Sc5 down to 6/8 with a guestimate of 4/8 Ci2 above that	
114649	**P13↑**	**FL005**	Start of profile to FL044	
114950	**P13↑**	**FL034**	Cloud base FL034	
115040	**P13↑**	**FL044**	Cloud top FL044	
115119	**4.2**	**FL042**	Start of in cloud run	
120127	**P14↑**	**FL042**	Start of profile climb to FL050	
			Cloud 8/8 Sc5 with 3/8 Ci2 and 3/8 Ci1 (Total Ci cover 5/8)	
120236	**4.3**	**FL050**	Start of above cloud run	
121509	**P15↑**	**FL050**	Start of profile to FL055	
121618	**5.1**	**FL055**	Start of Herc chasing run 8/8 Sc5 below total 4/8 Ci above made up of 3/8 Ci2 and 2/8 Ci1	
123035	**P16↓**	**FL055**	Profile to FL040	
123135	**P16↓**	**FL046**	Into 8/8 Sc5	
123157	**5.2**	**FL040**	Start of in cloud run behind Herc	
124146	**P17↓**	**FL040**	Start of profile descent FL005 with cloud base at FL037 – 7/8 Sc5 above	
124531	**5.3**	**FL005**	Start of below cloud run under 7/8 Sc5	
125534	**P18↑**	**FL005**	Profile climb to FL230	
125904	**P18↑**	**FL042**	Out of 7/8 Sc5 with 3/8 Ci1 and 3/8 Ci2 above	
1313	**P18↑**	**FL190**	No sig change to cloud (except the Ci is a bit nearer now)	
131626	**6**	**FL230**	Start of dropsonde run – cloud as above	
1329	**6**	**FL230**	Ci2 increase to 4/8	
1339	**6**	**FL230**	Ci2 increase to 6/8	
1411	**6**	**FL230**	Approaching edge of Sc5 sheet	
1420	**6**	**FL230**	1/8 Sc5 1/8 and ac3 below 5/8 Ci2 above	
1423	**6**	**FL230**	Sc5 increasing to 6/8 all other layers the same	
142508	**P19↓**	**FL230**	Start of profile descent. Presume this will last until touch-down/landing/impact.	
1435	**P19↓**	**FL127**	7/8 Sc5 below and we appear to be level with Ac3 bits at this height	
1440	**P19↓**	**FL083**	Clear of Sc5 sheet now nil below no change above (except that Ac3 is up there now)	
144309	**P19↓**	**FL070**	Profile interrupted	
145551	**P19↓**	**FL070**	Profile Re-start	
150404	**P19↓**	**0**	End of profile. End of science.	

Flight #	B414	Date	4/11/08	Operator(s)	JNB	log page	4	of	4

Time	Run id	Alt/FL	*Remarks*	Sys

Wet Nephelometer Log

Flight No **B414**.. Date 04/11/2008.. Operator's name DAT…… Page .1..... of .....

GMT	Run	Height	Sample flow	Dry neph RH	Wet neph RH	Temp ramp	T_{water}	Remarks
095341	R1	6000ft	11.6	17.8	40.3	10	20	
095730	R1	6000ft	11.6	22.0	32.4	40	17	
100229	R1	6000ft	11.5	21.3	63.5	37	40	
101440	R2.1	500ft	13.9	55.3	73.2	10	37	
103742	R2.3	5000ft	11.9	24.3	31.6	40	10	
104332			11.9	18.1	64.9	10	40	
105709	R3.1	500ft	13.8	36.0	38.2	40	11	
112350	R3.3		12.0	0.0	61.2	10	40	
113850	R4.1	500ft	13.8	32.4	36.0	40	10	
114530	R4.1	500ft	13.8	35	70.1	10	40	
120320	R4.3	5000ft	11.9	0.8	31.8	40	22	
121202	R4.3	5000ft	11.9	0.0	56.0	10	40	
124845	R5.3	500ft	13.7	35.7	35.3	45	10	
125803			12.6	33.4	83.3	10	45	

B414_SWS_SHIMS_EventLog.txt

```
07:47:42.51  ---      -     -     -     -
07:47:42.51  ---      -     -     -     -  +++ SOFTWARE START/RESTART +++
07:47:42.51  ---      -     -     -     -  +++ hh:mm:ss.ff / Instr / Posn / Period /
                                            tVIS/ tNIR / Comment +++
07:47:42.51  ---      -     -     -     -  +++ Flight no. B414
07:47:42.51  ---      -     -     -     -
07:47:51.25  SWS      -     -     -     -  Telescope motor initialised.
07:47:54.01  SWS    0.0     -     -     -  Telescope sent to -6.000
07:47:54.56  SWS   -6.0     -     -     -  Telescope stopped.
07:47:58.80  SWS      -   100     -     -  Sample period changed from 250ms to 100ms.
07:48:03.55  USH      -   100     -     -  Sample period changed from 250ms to 100ms.
07:48:07.12  SWS      -     -     -     -  Initialization: VIS OK NIR OK
07:48:08.00  LSH      -   100     -     -  Sample period changed from 250ms to 100ms.
07:48:08.51  USH      -     -     -     -  Initialization: VIS OK NIR OK
07:48:09.86  LSH      -     -     -     -  Initialization: VIS OK NIR OK
07:48:14.15  SWS      -     -     -     5  NIR int.time changed from 5ms to 5ms.
07:48:21.86  SWS      -     -   100     -  VIS int.time changed from 5ms to 100ms.
07:48:21.86  SWS      -     -     -   100  NIR int.time changed from 5ms to 100ms.
07:48:23.98  USH      -     -     -     5  NIR int.time changed from 5ms to 5ms.
07:48:27.33  USH      -     -   100     -  VIS int.time changed from 5ms to 100ms.
07:48:27.33  USH      -     -     -   100  NIR int.time changed from 5ms to 100ms.
07:48:29.62  LSH      -     -     -     5  NIR int.time changed from 5ms to 5ms.
07:48:32.76  LSH      -     -   600     -  VIS int.time changed from 5ms to 600ms.
07:48:32.77  LSH      -     -     -   600  NIR int.time changed from 5ms to 600ms.
07:48:35.95  SWS      -     -     -     -  Manual scene recording started.
07:48:35.95  LSH      -     -     -     -  Manual scene recording started.
07:48:35.96  USH      -     -     -     -  Manual scene recording started.
07:48:46.13  SWS      -     -     -     -  Idling
07:48:46.14  USH      -     -     -     -  Idling
07:48:46.25  LSH      -     -     -     -  Idling
07:49:19.78  LSH      -     -     -     -  Dark measurement started.
07:49:20.61  LSH      -     -     -     -  Warning: Abnormally bright dark measurement.
07:49:26.23  LSH      -     -     -     -  Idling
07:49:36.94  SWS   -6.0     -     -     -  Telescope sent to 174.000
07:49:38.60  SWS  170.4     -     -     -  Telescope stopped.
09:11:27.34  USH      -     -     -     -  Manual scene recording started.
09:11:27.35  LSH      -     -     -     -  Manual scene recording started.
09:11:27.36  SWS      -     -     -     -  Manual scene recording started.
09:11:32.98  USH      -     -     -     -  Idling
09:11:32.98  SWS      -     -     -     -  Idling
09:11:33.41  USH      -     -     -     -  Idling
09:11:33.42  SWS      -     -     -     -  Idling
09:11:33.42  LSH      -     -     -     -  Idling
09:11:42.94  SWS  174.0     -     -     -  Telescope sent to 90.000
09:47:46.84  SWS   90.0     -     -     -  Telescope sent to -6.000
09:47:47.98  SWS   -6.0     -     -     -  Telescope stopped.
09:47:50.83  SWS      -     -     -     -  Manual scene recording started.
09:47:50.83  LSH      -     -     -     -  Manual scene recording started.
09:47:50.84  USH      -     -     -     -  Manual scene recording started.
09:47:58.68  ---      -     -     -     -  Reset shutters.
09:48:05.69  USH      -     -     -     -  Dark measurement started.
09:48:05.69  SWS      -     -     -     -  Dark measurement started.
09:48:05.79  LSH      -     -     -     -  Dark measurement started.
09:48:07.13  USH      -     -     -     -  Manual scene recording started.
09:48:07.37  SWS      -     -     -     -  Manual scene recording started.
09:48:12.54  LSH      -     -     -     -  Manual scene recording started.
09:51:05.02  SWS      -     -     -     -  Dark measurement started.
09:51:05.04  USH      -     -     -     -  Dark measurement started.
09:51:05.14  LSH      -     -     -     -  Dark measurement started.
09:51:06.50  SWS      -     -     -     -  Manual scene recording started.
09:51:06.68  USH      -     -     -     -  Manual scene recording started.
09:51:09.12  USH      -     -     -     -  Dark measurement started.
09:51:09.17  SWS      -     -     -     -  Dark measurement started.
09:51:10.62  USH      -     -     -     -  Manual scene recording started.
09:51:10.78  SWS      -     -     -     -  Manual scene recording started.
09:51:11.90  LSH      -     -     -     -  Manual scene recording started.
09:52:42.53  ---      -     -     -     -  *** cirrus above
```

09:53:01.81	---	-	-	-	-	*** firs t run
09:53:31.88	---	-	-	-	-	*** above brokrn srat0cumulus sheet below
09:54:08.47	---	-	-	-	-	*** 14 deg
09:59:51.71	---	-	-	-	-	*** 15 deg
10:00:16.46	---	-	-	-	-	*** 14 deg
10:00:52.09	SWS	-6.0	-	-	-	Telescope sent to 174.000
10:00:53.81	SWS	172.8	-	-	-	Telescope stopped.
10:02:22.22	SWS	174.0	-	-	-	Telescope sent to -6.000
10:02:23.92	SWS	-4.6	-	-	-	Telescope stopped.
10:03:18.49	---	-	-	-	-	*** 13 deg
10:03:39.87	---	-	-	-	-	*** end of run
10:06:49.51	---	-	-	-	-	*** cloud top 3100 ft
10:09:49.01	---	-	-	-	-	*** 12 deg
10:10:29.35	SWS	-6.0	-	-	-	Telescope sent to 174.000
10:10:31.06	SWS	172.9	-	-	-	Telescope stopped.
10:13:08.46	---	-	-	-	-	*** 14 deg
10:13:12.55	LSH	-	-	-	-	Idling
10:13:12.58	USH	-	-	-	-	Idling
10:13:12.58	SWS	-	-	-	-	Idling
10:13:14.00	SWS	174.0	-	-	-	Telescope sent to -6.000
10:13:15.76	SWS	-5.9	-	-	-	Telescope stopped.
10:13:17.10	SWS	-	-	-	-	Manual scene recording started.
10:13:17.10	LSH	-	-	-	-	Manual scene recording started.
10:13:17.11	USH	-	-	-	-	Manual scene recording started.
10:13:44.30	---	-	-	-	-	Reset shutters.
10:13:48.66	SWS	-	-	-	-	Dark measurement started.
10:13:48.70	LSH	-	-	-	-	Dark measurement started.
10:13:48.72	USH	-	-	-	-	Dark measurement started.
10:13:49.39	USH	-	-	-	-	Dark measurement started.
10:13:49.69	LSH	-	-	-	-	Dark measurement started.
10:13:50.12	SWS	-	-	-	-	Manual scene recording started.
10:13:50.88	USH	-	-	-	-	Idling
10:13:54.17	SWS	-	-	-	-	Idling
10:13:56.19	LSH	-	-	-	-	Idling
10:14:05.51	SWS	-	-	-	-	Dark measurement started.
10:14:05.51	LSH	-	-	-	-	Dark measurement started.
10:14:05.52	USH	-	-	-	-	Dark measurement started.
10:14:06.95	SWS	-	-	-	-	Idling
10:14:07.37	USH	-	-	-	-	Idling
10:14:09.09	USH	-	-	-	-	Dark measurement started.
10:14:09.10	SWS	-	-	-	-	Dark measurement started.
10:14:10.53	USH	-	-	-	-	Idling
10:14:10.73	SWS	-	-	-	-	Idling
10:14:11.28	SWS	-	-	-	-	Dark measurement started.
10:14:11.28	USH	-	-	-	-	Dark measurement started.
10:14:12.16	LSH	-	-	-	-	Idling
10:14:12.73	SWS	-	-	-	-	Idling
10:14:12.93	USH	-	-	-	-	Idling
10:14:19.21	USH	-	-	-	-	Manual scene recording started.
10:14:19.23	SWS	-	-	-	-	Manual scene recording started.
10:14:19.23	LSH	-	-	-	-	Manual scene recording started.
10:18:03.13	SWS	-	-	-	-	Idling
10:18:03.15	USH	-	-	-	-	Idling
10:18:03.19	LSH	-	-	-	-	Idling
10:18:10.71	SWS	-	-	-	-	Dark measurement started.
10:18:10.72	LSH	-	-	-	-	Dark measurement started.
10:18:10.74	USH	-	-	-	-	Dark measurement started.
10:18:12.17	SWS	-	-	-	-	Idling
10:18:12.57	USH	-	-	-	-	Idling
10:18:17.37	LSH	-	-	-	-	Idling
10:18:18.18	SWS	-	-	-	-	Dark measurement started.
10:18:18.18	LSH	-	-	-	-	Dark measurement started.
10:18:18.19	USH	-	-	-	-	Dark measurement started.
10:18:19.63	SWS	-	-	-	-	Idling
10:18:20.04	USH	-	-	-	-	Idling
10:18:23.45	SWS	-	-	40	-	VIS int.time changed from 100ms to 40ms.
10:18:23.46	SWS	-	-	-	40	NIR int.time changed from 100ms to 40ms.
10:18:24.83	LSH	-	-	-	-	Idling
10:18:26.73	USH	-	-	40	-	VIS int.time changed from 100ms to 40ms.

10:18:26.74	USH	-	-	-	40	NIR int.time changed from 100ms to 40ms.
10:18:28.19	SWS	-	-	-	-	Dark measurement started.
10:18:28.19	LSH	-	-	-	-	Dark measurement started.
10:18:28.20	USH	-	-	-	-	Dark measurement started.
10:18:29.96	SWS	-	-	-	-	Idling
10:18:30.04	USH	-	-	-	-	Idling
10:18:31.31	SWS	-	-	-	-	Dark measurement started.
10:18:31.32	USH	-	-	-	-	Dark measurement started.
10:18:32.16	SWS	-	-	-	-	Idling
10:18:32.39	USH	-	-	-	-	Idling
10:18:35.12	LSH	-	-	-	-	Idling
10:18:40.71	SWS	-	-	-	-	Manual scene recording started.
10:18:40.71	LSH	-	-	-	-	Manual scene recording started.
10:18:40.73	USH	-	-	-	-	Manual scene recording started.
10:21:41.14	---	-	-	-	-	*** end of run
10:21:53.85	---	-	-	-	-	*** profile 4 climbing
10:22:50.49	---	-	-	-	-	*** start of run at 1500 ft run 2.2
10:24:26.66	USH	-	-	-	-	Idling
10:24:26.66	SWS	-	-	-	-	Idling
10:24:26.72	LSH	-	-	-	-	Idling
10:24:26.74	SWS	-	-	-	-	Idling
10:24:32.82	SWS	-	-	-	-	Dark measurement started.
10:24:32.83	LSH	-	-	-	-	Dark measurement started.
10:24:32.84	USH	-	-	-	-	Dark measurement started.
10:24:33.67	SWS	-	-	-	-	Idling
10:24:34.07	USH	-	-	-	-	Idling
10:24:39.49	LSH	-	-	-	-	Idling
10:24:39.84	SWS	-	-	-	-	Dark measurement started.
10:24:39.84	LSH	-	-	-	-	Dark measurement started.
10:24:39.85	USH	-	-	-	-	Dark measurement started.
10:24:40.69	SWS	-	-	-	-	Idling
10:24:41.11	USH	-	-	-	-	Idling
10:24:46.50	LSH	-	-	-	-	Idling
10:24:50.11	SWS	-	-	-	-	Manual scene recording started.
10:24:50.11	LSH	-	-	-	-	Manual scene recording started.
10:24:50.12	USH	-	-	-	-	Manual scene recording started.
10:27:20.56	---	-	-	-	-	*** end of run
10:27:29.56	---	-	-	-	-	*** profile 5
10:28:47.06	---	-	-	-	-	*** goimg into cloud
10:28:51.32	---	-	-	-	-	*** run
10:29:20.26	---	-	-	-	-	*** in cloud 2.,3 at 3000 ft cloud bae is at 2700 ft
10:30:22.64	SWS	-	-	-	-	Idling
10:30:22.65	USH	-	-	-	-	Idling
10:30:22.74	LSH	-	-	-	-	Idling
10:30:30.34	SWS	-	-	-	-	Dark measurement started.
10:30:31.18	SWS	-	-	-	-	Idling
10:30:32.08	USH	-	-	-	-	Dark measurement started.
10:30:32.94	USH	-	-	-	-	Idling
10:30:37.62	SWS	-	-	-	-	Dark measurement started.
10:30:38.48	SWS	-	-	-	-	Idling
10:30:39.77	USH	-	-	-	-	Dark measurement started.
10:30:40.62	USH	-	-	-	-	Idling
10:30:41.43	LSH	-	-	-	-	Dark measurement started.
10:30:45.23	SWS	-	-	-	-	Dark measurement started.
10:30:46.15	SWS	-	-	-	-	Idling
10:30:47.30	USH	-	-	-	-	Manual scene recording started.
10:30:47.88	LSH	-	-	-	-	Idling
10:30:49.87	USH	-	-	-	-	Dark measurement started.
10:30:50.71	USH	-	-	-	-	Manual scene recording started.
10:30:56.62	SWS	-	-	-	-	Manual scene recording started.
10:30:56.63	LSH	-	-	-	-	Manual scene recording started.
10:31:36.44	SWS	-6.0	-	-	-	Telescope sent to 174.000
10:31:38.12	SWS	171.6	-	-	-	Telescope stopped.
10:31:58.01	---	-	-	-	-	*** 12 deg
10:32:54.35	---	-	-	-	-	*** cloud base has lifted here now skimming in and out of cloud
10:32:59.94	SWS	174.0	-	-	-	Telescope sent to -6.000
10:33:01.69	SWS	-5.9	-	-	-	Telescope stopped.

```
10:33:43.78  ---      -     -     -     -  *** 13 deg
10:34:13.16  ---      -     -     -     -  *** end of run
10:34:21.26  ---      -     -     -     -  *** profile climb
10:36:21.20  ---      -     -     -     -  *** above cloud run
10:36:46.05  ---      -     -     -     -  *** cirrus above
10:38:01.23  USH      -     -     -     -  Idling
10:38:01.31  SWS      -     -     -     -  Idling
10:38:01.33  LSH      -     -     -     -  Idling
10:38:04.78  USH      -     -     -     -  Dark measurement started.
10:38:04.79  LSH      -     -     -     -  Dark measurement started.
10:38:04.80  SWS      -     -     -     -  Dark measurement started.
10:38:05.64  USH      -     -     -     -  Idling
10:38:06.05  SWS      -     -     -     -  Idling
10:38:11.44  LSH      -     -     -     -  Idling
10:38:11.79  SWS      -     -     -     -  Dark measurement started.
10:38:11.80  LSH      -     -     -     -  Dark measurement started.
10:38:11.81  USH      -     -     -     -  Dark measurement started.
10:38:12.71  SWS      -     -     -     -  Idling
10:38:13.08  USH      -     -     -     -  Idling
10:38:18.44  LSH      -     -     -     -  Idling
10:38:19.60  USH      -     -     -     -  Manual scene recording started.
10:38:19.61  LSH      -     -     -     -  Manual scene recording started.
10:38:19.62  SWS      -     -     -     -  Manual scene recording started.
10:39:20.16  ---      -     -     -     -  *** 13 deg
10:41:43.38  ---      -     -     -     -  *** 14 deg
10:44:16.53  ---      -     -     -     -  *** 13 deg
10:45:29.01  SWS   -6.0     -     -     -  Telescope sent to 174.000
10:45:30.74  SWS  173.2     -     -     -  Telescope stopped.
10:46:50.79  SWS  174.0     -     -     -  Telescope sent to -6.000
10:46:52.50  SWS   -3.4     -     -     -  Telescope stopped.
10:47:10.35  ---      -     -     -     -  *** profile 7 descending to low alt
10:48:02.78  ---      -     -     -     -  *** going into cloud
10:49:19.26  ---      -     -     -     -  *** leaving cloud CT 4100 ft
10:49:33.43  ---      -     -     -     -  *** cloud base 2900 ft
10:53:45.41  ---      -     -     -     -  *** 50 ft
10:53:49.09  ---      -     -     -     -  *** 12 deg
10:54:36.50  ---      -     -     -     -  *** run below cloud at 500 ft
10:54:47.19  ---      -     -     -     -  *** run 3.1`
10:55:03.07  LSH      -     -     -     -  Dark measurement started.
10:55:09.56  LSH      -     -     -     -  Manual scene recording started.
10:55:16.86  LSH      -     -   100     -  VIS int.time changed from 600ms to 100ms.
10:55:16.87  LSH      -     -     -   100  NIR int.time changed from 600ms to 100ms.
10:55:20.61  LSH      -     -     -     -  Dark measurement started.
10:55:22.06  LSH      -     -     -     -  Manual scene recording started.
10:55:26.94  USH      -     -     -     -  Idling
10:55:26.95  SWS      -     -     -     -  Idling
10:55:26.97  LSH      -     -     -     -  Idling
10:55:26.99  SWS      -     -     -     -  Idling
10:55:41.33  USH      -     -     -     -  Dark measurement started.
10:55:41.33  LSH      -     -     -     -  Dark measurement started.
10:55:41.35  SWS      -     -     -     -  Dark measurement started.
10:55:42.18  USH      -     -     -     -  Idling
10:55:42.59  SWS      -     -     -     -  Idling
10:55:43.01  LSH      -     -     -     -  Idling
10:55:44.01  SWS      -     -     -     -  Dark measurement started.
10:55:44.01  LSH      -     -     -     -  Dark measurement started.
10:55:44.02  USH      -     -     -     -  Dark measurement started.
10:55:44.85  SWS      -     -     -     -  Idling
10:55:45.30  USH      -     -     -     -  Idling
10:55:45.67  LSH      -     -     -     -  Idling
10:55:46.45  SWS      -     -     -     -  Dark measurement started.
10:55:46.45  LSH      -     -     -     -  Dark measurement started.
10:55:46.46  USH      -     -     -     -  Dark measurement started.
10:55:47.30  SWS      -     -     -     -  Idling
10:55:47.74  USH      -     -     -     -  Idling
10:55:48.13  LSH      -     -     -     -  Idling
10:55:53.44  USH      -     -     -     -  Manual scene recording started.
10:55:53.45  LSH      -     -     -     -  Manual scene recording started.
10:55:53.46  SWS      -     -     -     -  Manual scene recording started.
```

```
11:01:37.19  ---      -     -     -     -  *** 11 deg
11:02:04.18  ---      -     -     -     -  *** broken cloud  above
11:03:47.80  ---      -     -     -     -  *** 12 deg
11:04:40.41  ---      -     -     -     -  *** end of run profile climb
11:04:54.62  ---      -     -     -     -  *** profile 9
11:06:18.45  ---      -     -     -     -  ***
11:06:18.47  USH      -     -     -     -  Idling
11:06:18.49  LSH      -     -     -     -  Idling
11:06:18.55  SWS      -     -     -     -  Idling
11:06:24.66  USH      -     -     -     -  Dark measurement started.
11:06:24.66  LSH      -     -     -     -  Dark measurement started.
11:06:24.67  SWS      -     -     -     -  Dark measurement started.
11:06:25.50  USH      -     -     -     -  Idling
11:06:25.96  SWS      -     -     -     -  Idling
11:06:26.34  LSH      -     -     -     -  Idling
11:06:26.91  SWS      -     -     -     -  Dark measurement started.
11:06:26.91  LSH      -     -     -     -  Dark measurement started.
11:06:26.93  USH      -     -     -     -  Dark measurement started.
11:06:27.81  SWS      -     -     -     -  Idling
11:06:28.25  USH      -     -     -     -  Idling
11:06:28.60  LSH      -     -     -     -  Idling
11:06:28.87  SWS      -     -     -     -  Dark measurement started.
11:06:28.88  LSH      -     -     -     -  Dark measurement started.
11:06:28.89  USH      -     -     -     -  Dark measurement started.
11:06:29.94  USH      -     -     -     -  Idling
11:06:30.18  SWS      -     -     -     -  Idling
11:06:30.36  LSH      -     -     -     -  Idling
11:06:36.14  SWS      -     -     -     -  Manual scene recording started.
11:06:36.14  LSH      -     -     -     -  Manual scene recording started.
11:06:36.16  USH      -     -     -     -  Manual scene recording started.
11:07:47.95  ---      -     -     -     -  *** in cloud
11:07:59.75  ---      -     -     -     -  *** above cloud
11:08:13.40  ---      -     -     -     -  *** dropping into cloud agsain
11:08:20.22  ---      -     -     -     -  *** cloud base 3200 ft
11:08:53.79  ---      -     -     -     -  *** in cloud run at 3600 ft run 3.2
11:09:24.74  LSH      -     -     -     -  Idling
11:09:24.76  SWS      -     -     -     -  Idling
11:09:24.85  USH      -     -     -     -  Idling
11:09:32.17  LSH      -     -     -     -  Dark measurement started.
11:09:32.18  USH      -     -     -     -  Dark measurement started.
11:09:32.21  SWS      -     -     -     -  Dark measurement started.
11:09:33.29  USH      -     -     -     -  Idling
11:09:33.45  SWS      -     -     -     -  Idling
11:09:33.63  LSH      -     -     -     -  Idling
11:09:36.25  SWS      -     -     -     -  Dark measurement started.
11:09:36.26  LSH      -     -     -     -  Dark measurement started.
11:09:36.27  USH      -     -     -     -  Dark measurement started.
11:09:37.11  SWS      -     -     -     -  Idling
11:09:37.52  USH      -     -     -     -  Idling
11:09:37.92  LSH      -     -     -     -  Idling
11:09:38.67  LSH      -     -     -     -  Dark measurement started.
11:09:38.68  USH      -     -     -     -  Dark measurement started.
11:09:38.69  SWS      -     -     -     -  Dark measurement started.
11:09:39.72  USH      -     -     -     -  Idling
11:09:39.96  SWS      -     -     -     -  Idling
11:09:40.14  LSH      -     -     -     -  Idling
11:09:45.31  USH      -     -     -     -  Manual scene recording started.
11:09:45.31  LSH      -     -     -     -  Manual scene recording started.
11:09:45.34  SWS      -     -     -     -  Manual scene recording started.
11:14:49.64  LSH      -     -     -     -  Idling
11:14:49.69  USH      -     -     -     -  Idling
11:14:49.71  SWS      -     -     -     -  Idling
11:14:57.14  USH      -     -     -     -  Dark measurement started.
11:14:57.15  LSH      -     -     -     -  Dark measurement started.
11:14:57.17  SWS      -     -     -     -  Dark measurement started.
11:14:58.01  USH      -     -     -     -  Idling
11:14:58.42  SWS      -     -     -     -  Idling
11:14:58.84  LSH      -     -     -     -  Idling
11:14:59.54  USH      -     -     -     -  Dark measurement started.
```

```
11:14:59.56  SWS      -     -     -     -  Dark measurement started.
11:14:59.56  LSH      -     -     -     -  Dark measurement started.
11:15:00.45  USH      -     -     -     -  Idling
11:15:00.64  SWS      -     -     -     -  Idling
11:15:01.42  LSH      -     -     -     -  Idling
11:15:08.96  SWS   -6.0     -     -     -  Telescope sent to 174.000
11:15:10.69  SWS  173.5     -     -     -  Telescope stopped.
11:15:11.48  USH      -     -     -     -  Manual scene recording started.
11:15:11.48  LSH      -     -     -     -  Manual scene recording started.
11:15:11.50  SWS      -     -     -     -  Manual scene recording started.
11:15:54.57  ---      -     -     -     -  *** 14 deg
11:17:16.93  SWS  174.0     -     -     -  Telescope sent to -6.000
11:17:18.69  SWS   -5.9     -     -     -  Telescope stopped.
11:18:12.46  ---      -     -     -     -  *** end of run
11:18:21.33  ---      -     -     -     -  *** profile 10
11:18:50.11  ---      -     -     -     -  *** above cloud now
11:19:57.21  ---      -     -     -     -  *** start of run above strat and below cirrus
11:20:02.04  ---      -     -     -     -  *** run 3.3
11:22:01.70  ---      -     -     -     -  *** 13 deg
11:22:24.00  LSH      -     -     -     -  Idling
11:22:24.01  USH      -     -     -     -  Idling
11:22:24.06  SWS      -     -     -     -  Idling
11:22:30.43  SWS      -     -     -     -  Dark measurement started.
11:22:30.43  LSH      -     -     -     -  Dark measurement started.
11:22:30.45  USH      -     -     -     -  Dark measurement started.
11:22:31.33  SWS      -     -     -     -  Idling
11:22:31.74  USH      -     -     -     -  Idling
11:22:31.81  SWS      -     -     -     -  Dark measurement started.
11:22:31.82  USH      -     -     -     -  Dark measurement started.
11:22:32.14  LSH      -     -     -     -  Idling
11:22:32.68  USH      -     -     -     -  Idling
11:22:32.87  SWS      -     -     -     -  Idling
11:22:32.91  SWS      -     -     -     -  Dark measurement started.
11:22:32.91  LSH      -     -     -     -  Dark measurement started.
11:22:32.94  USH      -     -     -     -  Dark measurement started.
11:22:33.77  SWS      -     -     -     -  Idling
11:22:34.19  USH      -     -     -     -  Idling
11:22:34.60  LSH      -     -     -     -  Idling
11:22:37.88  USH      -     -     -     -  Dark measurement started.
11:22:37.89  LSH      -     -     -     -  Dark measurement started.
11:22:37.90  SWS      -     -     -     -  Dark measurement started.
11:22:38.75  USH      -     -     -     -  Idling
11:22:39.18  SWS      -     -     -     -  Idling
11:22:39.38  SWS      -     -     -     -  Dark measurement started.
11:22:39.38  USH      -     -     -     -  Dark measurement started.
11:22:39.57  LSH      -     -     -     -  Idling
11:22:39.67  LSH      -     -     -     -  Manual scene recording started.
11:22:40.26  SWS      -     -     -     -  Idling
11:22:40.50  USH      -     -     -     -  Idling
11:22:43.53  SWS      -     -     -     -  Manual scene recording started.
11:22:43.54  USH      -     -     -     -  Manual scene recording started.
11:25:10.64  ---      -     -     -     -  *** F
11:25:16.47  ---      -     -     -     -  *** l 045
11:26:44.08  ---      -     -     -     -  *** 12 deg
11:27:14.11  ---      -     -     -     -  *** 13 deg
11:28:56.07  SWS   -6.0     -     -     -  Telescope sent to 174.000
11:28:57.82  SWS  173.8     -     -     -  Telescope stopped.
11:29:18.25  LSH      -     -     -     -  Idling
11:29:18.26  SWS      -     -     -     -  Idling
11:29:18.31  USH      -     -     -     -  Idling
11:29:22.43  USH      -     -     -     -  Dark measurement started.
11:29:22.43  LSH      -     -     -     -  Dark measurement started.
11:29:22.47  SWS      -     -     -     -  Dark measurement started.
11:29:23.28  USH      -     -     -     -  Idling
11:29:23.69  SWS      -     -     -     -  Idling
11:29:24.10  LSH      -     -     -     -  Idling
11:29:25.46  SWS      -     -     -     -  Dark measurement started.
11:29:25.47  LSH      -     -     -     -  Dark measurement started.
11:29:25.49  USH      -     -     -     -  Dark measurement started.
```

11:29:26.33	SWS	-	-	-	-	Idling
11:29:26.77	USH	-	-	-	-	Idling
11:29:27.14	LSH	-	-	-	-	Idling
11:29:35.14	SWS	-	-	-	-	Manual scene recording started.
11:29:35.15	LSH	-	-	-	-	Manual scene recording started.
11:29:35.17	USH	-	-	-	-	Manual scene recording started.
11:30:06.51	---	-	-	-	-	*** end of run
11:30:17.61	---	-	-	-	-	*** profile descent to 50 ft
11:30:54.08	---	-	-	-	-	*** going into cloud
11:31:41.35	---	-	-	-	-	*** below cloud
11:32:28.49	---	-	-	-	-	*** when reach 50 ft view will change from nadir to zenith
11:33:12.70	---	-	-	-	-	*** 14 deg
11:36:01.00	SWS	174.0	-	-	-	Telescope sent to -6.000
11:36:02.74	SWS	-5.7	-	-	-	Telescope stopped.
11:36:17.54	---	-	-	-	-	*** 13 deg
11:36:49.98	---	-	-	-	-	*** run at 500 ft
11:36:53.85	---	-	-	-	-	*** run 4.1
11:37:37.66	---	-	-	-	-	*** broken cloud above
11:38:20.95	SWS	-	-	-	-	Idling
11:38:21.02	LSH	-	-	-	-	Idling
11:38:21.05	USH	-	-	-	-	Idling
11:38:31.29	USH	-	-	-	-	Dark measurement started.
11:38:31.30	LSH	-	-	-	-	Dark measurement started.
11:38:31.33	SWS	-	-	-	-	Dark measurement started.
11:38:32.23	USH	-	-	-	-	Idling
11:38:32.42	SWS	-	-	-	-	Idling
11:38:33.19	LSH	-	-	-	-	Idling
11:38:34.56	USH	-	-	-	-	Dark measurement started.
11:38:34.57	LSH	-	-	-	-	Dark measurement started.
11:38:34.58	SWS	-	-	-	-	Dark measurement started.
11:38:35.41	USH	-	-	-	-	Idling
11:38:35.83	SWS	-	-	-	-	Idling
11:38:36.25	LSH	-	-	-	-	Idling
11:38:43.71	SWS	-	-	-	-	Manual scene recording started.
11:38:43.72	LSH	-	-	-	-	Manual scene recording started.
11:38:43.73	USH	-	-	-	-	Manual scene recording started.
11:40:50.34	---	-	-	-	-	*** 13 deg
11:42:37.42	---	-	-	-	-	*** 12 deg
11:46:46.53	---	-	-	-	-	*** end of run start
11:46:54.44	---	-	-	-	-	*** of profile climb
11:49:46.31	---	-	-	-	-	*** base at 3400 ft
11:50:33.61	---	-	-	-	-	*** main base 3650 ft cloud top at 4400 ft
11:51:20.54	---	-	-	-	-	*** run at 4100 ft in cloud
11:51:30.78	---	-	-	-	-	*** run 4.2
11:52:28.41	LSH	-	-	-	-	Idling
11:52:28.42	USH	-	-	-	-	Idling
11:52:28.44	SWS	-	-	-	-	Idling
11:52:34.74	SWS	-	-	-	-	Dark measurement started.
11:52:34.74	LSH	-	-	-	-	Dark measurement started.
11:52:34.76	USH	-	-	-	-	Dark measurement started.
11:52:35.64	SWS	-	-	-	-	Idling
11:52:35.87	SWS	-	-	-	-	Dark measurement started.
11:52:36.04	USH	-	-	-	-	Idling
11:52:36.44	LSH	-	-	-	-	Idling
11:52:36.74	SWS	-	-	-	-	Idling
11:52:37.69	SWS	-	-	-	-	Dark measurement started.
11:52:37.70	LSH	-	-	-	-	Dark measurement started.
11:52:37.71	USH	-	-	-	-	Dark measurement started.
11:52:38.56	SWS	-	-	-	-	Idling
11:52:39.00	USH	-	-	-	-	Idling
11:52:39.36	LSH	-	-	-	-	Idling
11:52:46.92	USH	-	-	-	-	Manual scene recording started.
11:52:46.93	LSH	-	-	-	-	Manual scene recording started.
11:52:46.94	SWS	-	-	-	-	Manual scene recording started.
11:56:19.41	---	-	-	-	-	*** 13 deg
11:56:41.18	SWS	-	-	-	-	Idling
11:56:41.20	LSH	-	-	-	-	Idling
11:56:41.23	USH	-	-	-	-	Idling

```
11:56:46.84  USH      -     -     -     -  Dark measurement started.
11:56:46.85  LSH      -     -     -     -  Dark measurement started.
11:56:46.86  SWS      -     -     -     -  Dark measurement started.
11:56:47.70  USH      -     -     -     -  Idling
11:56:48.11  SWS      -     -     -     -  Idling
11:56:48.53  LSH      -     -     -     -  Idling
11:56:49.47  USH      -     -     -     -  Dark measurement started.
11:56:49.48  LSH      -     -     -     -  Dark measurement started.
11:56:49.50  SWS      -     -     -     -  Dark measurement started.
11:56:50.34  USH      -     -     -     -  Idling
11:56:50.75  SWS      -     -     -     -  Idling
11:56:51.12  LSH      -     -     -     -  Idling
11:56:59.76  SWS   -6.0     -     -     -  Telescope sent to 174.000
11:57:01.49  SWS  173.6     -     -     -  Telescope stopped.
11:57:02.03  SWS      -     -     -     -  Manual scene recording started.
11:57:02.04  LSH      -     -     -     -  Manual scene recording started.
11:57:02.05  USH      -     -     -     -  Manual scene recording started.
12:01:26.87  ---      -     -     -     -  *** end of run
12:01:31.43  ---      -     -     -     -  *** 14 deg
12:02:10.54  ---      -     -     -     -  *** cloud top 4000 sometjing
12:02:32.91  ---      -     -     -     -  *** start opf run when change to zenith
12:02:35.90  SWS  174.0     -     -     -  Telescope sent to -6.000
12:02:36.68  SWS      -     -     -     -  Warning: Clipping may be occurring.
12:02:37.64  SWS   -5.8     -     -     -  Telescope stopped.
12:02:42.98  USH      -     -     -     -  Idling
12:02:42.99  LSH      -     -     -     -  Idling
12:02:43.09  SWS      -     -     -     -  Idling
12:02:46.82  SWS      -     -     -     -  Dark measurement started.
12:02:46.84  LSH      -     -     -     -  Dark measurement started.
12:02:46.84  USH      -     -     -     -  Dark measurement started.
12:02:47.90  SWS      -     -     -     -  Idling
12:02:48.13  USH      -     -     -     -  Idling
12:02:48.33  LSH      -     -     -     -  Idling
12:02:49.43  SWS      -     -     -     -  Dark measurement started.
12:02:49.44  LSH      -     -     -     -  Dark measurement started.
12:02:49.45  USH      -     -     -     -  Dark measurement started.
12:02:50.36  SWS      -     -     -     -  Idling
12:02:50.73  USH      -     -     -     -  Idling
12:02:51.09  LSH      -     -     -     -  Idling
12:02:51.68  SWS      -     -     -     -  Dark measurement started.
12:02:51.69  LSH      -     -     -     -  Dark measurement started.
12:02:51.70  USH      -     -     -     -  Dark measurement started.
12:02:52.60  SWS      -     -     -     -  Idling
12:02:52.98  USH      -     -     -     -  Idling
12:02:53.39  LSH      -     -     -     -  Idling
12:02:57.21  SWS      -     -     -     -  Manual scene recording started.
12:02:57.22  LSH      -     -     -     -  Manual scene recording started.
12:02:57.24  USH      -     -     -     -  Manual scene recording started.
12:03:20.00  ---      -     -     -     -  *** stratocumulus below and cirrus above
12:06:02.68  ---      -     -     -     -  *** 13 deg
12:10:29.60  USH      -     -     -     -  Idling
12:10:29.69  LSH      -     -     -     -  Idling
12:10:29.71  SWS      -     -     -     -  Idling
12:10:33.50  SWS      -     -     -     -  Dark measurement started.
12:10:33.51  LSH      -     -     -     -  Dark measurement started.
12:10:33.52  USH      -     -     -     -  Dark measurement started.
12:10:34.36  SWS      -     -     -     -  Idling
12:10:34.79  USH      -     -     -     -  Idling
12:10:35.21  LSH      -     -     -     -  Idling
12:10:38.46  SWS   -6.0     -     -     -  Telescope sent to 174.000
12:10:40.21  SWS  173.9     -     -     -  Telescope stopped.
12:10:41.65  USH      -     -     -     -  Manual scene recording started.
12:10:41.65  SWS      -     -     -     -  Manual scene recording started.
12:10:41.66  LSH      -     -     -     -  Manual scene recording started.
12:10:45.38  LSH      -     -     -     -  Idling
12:10:45.44  SWS      -     -     -     -  Idling
12:10:45.45  USH      -     -     -     -  Idling
12:10:46.45  SWS      -     -     -     -  Dark measurement started.
12:10:46.45  LSH      -     -     -     -  Dark measurement started.
```

```
12:10:46.46  USH      -     -     -     -  Dark measurement started.
12:10:47.34  SWS      -     -     -     -  Idling
12:10:47.74  USH      -     -     -     -  Idling
12:10:48.13  LSH      -     -     -     -  Idling
12:10:53.38  LSH      -     -     -     -  Manual scene recording started.
12:10:53.38  USH      -     -     -     -  Manual scene recording started.
12:10:53.40  SWS      -     -     -     -  Manual scene recording started.
12:11:35.46  ---      -     -     -     -  *** 12 deg
12:13:16.17  ---      -     -     -     -  *** 13 deg
12:15:11.51  ---      -     -     -     -  *** end of run
12:15:18.55  ---      -     -     -     -  *** climbing
12:15:43.70  ---      -     -     -     -  *** run at 5500 ft
12:16:19.55  SWS  174.0     -     -     -  Telescope sent to -6.000
12:16:20.29  SWS      -     -     -     -  Warning: Clipping may be occurring.
12:16:21.26  SWS   -5.1     -     -     -  Telescope stopped.
12:16:25.13  LSH      -     -     -     -  Idling
12:16:25.18  SWS      -     -     -     -  Idling
12:16:25.25  USH      -     -     -     -  Idling
12:16:30.78  SWS      -     -     -     -  Dark measurement started.
12:16:30.78  LSH      -     -     -     -  Dark measurement started.
12:16:30.80  USH      -     -     -     -  Dark measurement started.
12:16:31.66  SWS      -     -     -     -  Idling
12:16:32.10  USH      -     -     -     -  Idling
12:16:32.48  LSH      -     -     -     -  Idling
12:16:34.40  SWS      -     -     -     -  Dark measurement started.
12:16:34.40  LSH      -     -     -     -  Dark measurement started.
12:16:34.42  USH      -     -     -     -  Dark measurement started.
12:16:35.26  SWS      -     -     -     -  Idling
12:16:35.69  USH      -     -     -     -  Idling
12:16:36.08  LSH      -     -     -     -  Idling
12:16:37.57  LSH      -     -     -     -  Dark measurement started.
12:16:37.57  USH      -     -     -     -  Dark measurement started.
12:16:37.61  SWS      -     -     -     -  Dark measurement started.
12:16:38.63  USH      -     -     -     -  Idling
12:16:38.86  SWS      -     -     -     -  Idling
12:16:39.03  LSH      -     -     -     -  Idling
12:16:40.69  SWS      -     -     -     -  Dark measurement started.
12:16:40.70  LSH      -     -     -     -  Dark measurement started.
12:16:40.72  USH      -     -     -     -  Dark measurement started.
12:16:41.57  SWS      -     -     -     -  Idling
12:16:42.00  USH      -     -     -     -  Idling
12:16:42.40  LSH      -     -     -     -  Idling
12:16:48.11  USH      -     -     -     -  Manual scene recording started.
12:16:48.11  LSH      -     -     -     -  Manual scene recording started.
12:16:48.13  SWS      -     -     -     -  Manual scene recording started.
12:18:48.50  ---      -     -     -     -  *** 14 deg
12:19:08.23  ---      -     -     -     -  *** C130 comparison
12:19:18.11  LSH      -     -     -     -  Idling
12:19:18.14  SWS      -     -     -     -  Idling
12:19:18.17  USH      -     -     -     -  Idling
12:19:22.78  SWS      -     -     -     -  Dark measurement started.
12:19:22.78  LSH      -     -     -     -  Dark measurement started.
12:19:22.81  USH      -     -     -     -  Dark measurement started.
12:19:23.68  SWS      -     -     -     -  Idling
12:19:24.05  USH      -     -     -     -  Idling
12:19:24.50  LSH      -     -     -     -  Idling
12:19:25.41  SWS      -     -     -     -  Dark measurement started.
12:19:25.41  LSH      -     -     -     -  Dark measurement started.
12:19:25.43  USH      -     -     -     -  Dark measurement started.
12:19:26.27  SWS      -     -     -     -  Idling
12:19:26.70  USH      -     -     -     -  Idling
12:19:27.11  LSH      -     -     -     -  Idling
12:19:27.90  USH      -     -     -     -  Dark measurement started.
12:19:27.91  SWS      -     -     -     -  Dark measurement started.
12:19:27.94  LSH      -     -     -     -  Dark measurement started.
12:19:28.78  USH      -     -     -     -  Idling
12:19:29.00  SWS      -     -     -     -  Idling
12:19:29.80  LSH      -     -     -     -  Idling
12:19:34.88  SWS   -6.0     -     -     -  Telescope sent to 174.000
```

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12:19:36.63  SWS  173.9     -     -     -  Telescope stopped.
12:19:37.54  USH      -     -     -     -  Manual scene recording started.
12:19:37.55  LSH      -     -     -     -  Manual scene recording started.
12:19:37.56  SWS      -     -     -     -  Manual scene recording started.
12:23:27.30  ---      -     -     -     -  *** 13 deg
12:28:25.01  LSH      -     -     -     -  Idling
12:28:25.05  SWS      -     -     -     -  Idling
12:28:25.07  USH      -     -     -     -  Idling
12:28:28.32  SWS  174.0     -     -     -  Telescope sent to -6.000
12:28:30.06  SWS   -5.9     -     -     -  Telescope stopped.
12:28:32.58  USH      -     -     -     -  Manual scene recording started.
12:28:32.59  SWS      -     -     -     -  Manual scene recording started.
12:28:32.60  LSH      -     -     -     -  Manual scene recording started.
12:28:42.16  LSH      -     -     -     -  Idling
12:28:42.18  USH      -     -     -     -  Idling
12:28:42.23  SWS      -     -     -     -  Idling
12:28:47.05  USH      -     -     -     -  Dark measurement started.
12:28:47.05  LSH      -     -     -     -  Dark measurement started.
12:28:47.07  SWS      -     -     -     -  Dark measurement started.
12:28:47.91  USH      -     -     -     -  Idling
12:28:48.32  SWS      -     -     -     -  Idling
12:28:48.76  LSH      -     -     -     -  Idling
12:28:50.09  SWS      -     -     -     -  Dark measurement started.
12:28:50.11  LSH      -     -     -     -  Dark measurement started.
12:28:50.13  USH      -     -     -     -  Dark measurement started.
12:28:50.97  SWS      -     -     -     -  Idling
12:28:51.40  USH      -     -     -     -  Idling
12:28:51.82  LSH      -     -     -     -  Idling
12:28:56.29  SWS      -     -     -     -  Manual scene recording started.
12:28:56.30  LSH      -     -     -     -  Manual scene recording started.
12:28:56.31  USH      -     -     -     -  Manual scene recording started.
12:30:56.16  ---      -     -     -     -  *** run ended
12:31:00.65  ---      -     -     -     -  *** descending
12:31:06.12  ---      -     -     -     -  *** 12 deg
12:31:41.00  ---      -     -     -     -  *** in cloud
12:31:48.92  ---      -     -     -     -  *** cloud top 4600 ft
12:32:03.24  ---      -     -     -     -  *** run in cloud
12:32:38.04  ---      -     -     -     -  *** 13 deg
12:32:52.71  LSH      -     -     -     -  Idling
12:32:52.73  SWS      -     -     -     -  Idling
12:32:52.74  USH      -     -     -     -  Idling
12:32:57.21  USH      -     -     -     -  Dark measurement started.
12:32:57.21  LSH      -     -     -     -  Dark measurement started.
12:32:57.23  SWS      -     -     -     -  Dark measurement started.
12:32:58.06  USH      -     -     -     -  Idling
12:32:58.52  SWS      -     -     -     -  Idling
12:32:58.88  LSH      -     -     -     -  Idling
12:32:59.80  SWS      -     -     -     -  Dark measurement started.
12:32:59.81  LSH      -     -     -     -  Dark measurement started.
12:32:59.82  USH      -     -     -     -  Dark measurement started.
12:33:00.70  SWS      -     -     -     -  Idling
12:33:01.07  USH      -     -     -     -  Idling
12:33:01.50  LSH      -     -     -     -  Idling
12:33:02.58  SWS      -     -     -     -  Dark measurement started.
12:33:02.58  LSH      -     -     -     -  Dark measurement started.
12:33:02.60  USH      -     -     -     -  Dark measurement started.
12:33:03.46  SWS      -     -     -     -  Idling
12:33:03.87  USH      -     -     -     -  Idling
12:33:04.27  LSH      -     -     -     -  Idling
12:33:11.18  SWS      -     -     -     -  Manual scene recording started.
12:33:11.19  LSH      -     -     -     -  Manual scene recording started.
12:33:11.20  USH      -     -     -     -  Manual scene recording started.
12:35:16.35  SWS      -     -     -     -  Idling
12:35:16.38  USH      -     -     -     -  Idling
12:35:16.41  USH      -     -     -     -  Idling
12:35:16.42  LSH      -     -     -     -  Idling
12:35:21.18  SWS      -     -     -     -  Dark measurement started.
12:35:21.18  LSH      -     -     -     -  Dark measurement started.
12:35:21.20  USH      -     -     -     -  Dark measurement started.
```

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12:35:22.05  SWS      -     -     -     -  Idling
12:35:22.48  USH      -     -     -     -  Idling
12:35:22.98  LSH      -     -     -     -  Idling
12:35:27.73  SWS      -     -    30     -  VIS int.time changed from 40ms to 30ms.
12:35:27.74  SWS      -     -     -    30  NIR int.time changed from 40ms to 30ms.
12:35:30.33  USH      -     -    30     -  VIS int.time changed from 40ms to 30ms.
12:35:30.34  USH      -     -     -    30  NIR int.time changed from 40ms to 30ms.
12:35:31.63  SWS      -     -     -     -  Dark measurement started.
12:35:31.63  LSH      -     -     -     -  Dark measurement started.
12:35:31.65  USH      -     -     -     -  Dark measurement started.
12:35:33.33  SWS      -     -     -     -  Idling
12:35:33.41  USH      -     -     -     -  Idling
12:35:33.95  LSH      -     -     -     -  Idling
12:35:34.04  SWS      -     -     -     -  Dark measurement started.
12:35:34.05  LSH      -     -     -     -  Dark measurement started.
12:35:34.06  USH      -     -     -     -  Dark measurement started.
12:35:34.79  SWS      -     -     -     -  Idling
12:35:35.25  USH      -     -     -     -  Idling
12:35:35.74  LSH      -     -     -     -  Idling
12:35:41.69  SWS   -6.0     -     -     -  Telescope sent to 174.000
12:35:43.44  SWS  173.8     -     -     -  Telescope stopped.
12:35:43.87  SWS      -     -     -     -  Manual scene recording started.
12:35:43.89  LSH      -     -     -     -  Manual scene recording started.
12:35:43.90  USH      -     -     -     -  Manual scene recording started.
12:37:43.12  ---      -     -     -     -  *** 14 deg
12:38:26.36  USH      -     -     -     -  Idling
12:38:26.46  LSH      -     -     -     -  Idling
12:38:26.47  SWS      -     -     -     -  Idling
12:38:29.79  SWS  174.0     -     -     -  Telescope sent to -6.000
12:38:31.53  SWS   -5.7     -     -     -  Telescope stopped.
12:38:32.84  USH      -     -     -     -  Manual scene recording started.
12:38:32.86  SWS      -     -     -     -  Manual scene recording started.
12:38:32.88  LSH      -     -     -     -  Manual scene recording started.
12:41:51.13  ---      -     -     -     -  *** end of run
12:42:03.28  ---      -     -     -     -  *** 5.2 profile 17
12:42:14.19  ---      -     -     -     -  *** descending to brlow cloud
12:42:44.74  ---      -     -     -     -  *** cloud bASE 3700 ft
12:43:51.36  ---      -     -     -     -  *** 15 deg
12:45:31.17  ---      -     -     -     -  *** run at 500 ft below cloud
12:45:50.15  ---      -     -     -     -  *** run 5.3
12:46:39.03  ---      -     -     -     -  *** 14 deg
12:48:03.90  USH      -     -     -     -  Idling
12:48:03.92  SWS      -     -     -     -  Idling
12:48:03.94  LSH      -     -     -     -  Idling
12:48:13.59  LSH      -     -     -     -  Dark measurement started.
12:48:13.61  USH      -     -     -     -  Dark measurement started.
12:48:13.62  SWS      -     -     -     -  Dark measurement started.
12:48:14.57  USH      -     -     -     -  Idling
12:48:14.77  SWS      -     -     -     -  Idling
12:48:15.03  USH      -     -     -     -  Dark measurement started.
12:48:15.03  SWS      -     -     -     -  Dark measurement started.
12:48:15.09  LSH      -     -     -     -  Idling
12:48:15.13  LSH      -     -     -     -  Dark measurement started.
12:48:15.78  USH      -     -     -     -  Idling
12:48:16.00  SWS      -     -     -     -  Idling
12:48:16.90  LSH      -     -     -     -  Idling
12:48:18.00  SWS      -     -     -     -  Dark measurement started.
12:48:18.00  LSH      -     -     -     -  Dark measurement started.
12:48:18.02  USH      -     -     -     -  Dark measurement started.
12:48:18.77  SWS      -     -     -     -  Idling
12:48:19.18  USH      -     -     -     -  Idling
12:48:19.68  LSH      -     -     -     -  Idling
12:48:20.99  SWS      -     -     -     -  Dark measurement started.
12:48:21.00  LSH      -     -     -     -  Dark measurement started.
12:48:21.02  USH      -     -     -     -  Dark measurement started.
12:48:21.75  SWS      -     -     -     -  Idling
12:48:22.19  USH      -     -     -     -  Idling
12:48:22.67  LSH      -     -     -     -  Idling
12:48:27.10  SWS      -     -     -     -  Manual scene recording started.
```

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12:48:27.11  LSH      -     -     -     -  Manual scene recording started.
12:48:27.12  USH      -     -     -     -  Manual scene recording started.
12:55:06.85  ---      -     -     -     -  *** 13 deg
12:55:42.40  ---      -     -     -     -  *** end of run
12:55:53.45  ---      -     -     -     -  *** profile climb to FL 230
12:55:59.53  ---      -     -     -     -  *** profile 18
13:01:32.85  ---      -     -     -     -  *** 12 deg
13:05:24.83  ---      -     -     -     -  *** 12 deg
13:06:07.48  SWS      -     -     -     -  Idling
13:06:07.53  USH      -     -     -     -  Idling
13:06:07.56  LSH      -     -     -     -  Idling
13:06:12.78  USH      -     -     -     -  Dark measurement started.
13:06:12.78  LSH      -     -     -     -  Dark measurement started.
13:06:12.80  SWS      -     -     -     -  Dark measurement started.
13:06:13.54  USH      -     -     -     -  Idling
13:06:13.98  SWS      -     -     -     -  Idling
13:06:14.47  LSH      -     -     -     -  Idling
13:06:15.39  SWS      -     -     -     -  Dark measurement started.
13:06:15.40  LSH      -     -     -     -  Dark measurement started.
13:06:15.42  USH      -     -     -     -  Dark measurement started.
13:06:16.18  SWS      -     -     -     -  Idling
13:06:16.59  USH      -     -     -     -  Idling
13:06:17.11  LSH      -     -     -     -  Idling
13:06:18.16  SWS      -     -     -     -  Dark measurement started.
13:06:18.17  USH      -     -     -     -  Dark measurement started.
13:06:18.21  LSH      -     -     -     -  Dark measurement started.
13:06:18.98  SWS      -     -     -     -  Idling
13:06:19.17  USH      -     -     -     -  Idling
13:06:20.06  LSH      -     -     -     -  Idling
13:06:27.24  SWS      -     -     -     -  Manual scene recording started.
13:06:27.25  LSH      -     -     -     -  Manual scene recording started.
13:06:27.26  USH      -     -     -     -  Manual scene recording started.
13:06:43.89  ---      -     -     -     -  *** 12 deg
13:09:17.97  ---      -     -     -     -  *** 11 deg
13:10:14.68  ---      -     -     -     -  *** 12 deg
13:13:34.50  USH      -     -     -     -  Idling
13:13:34.55  LSH      -     -     -     -  Idling
13:13:34.58  SWS      -     -     -     -  Idling
13:13:36.21  ---      -     -     -     -  Reset shutters.
13:13:42.18  SWS      -     -     -     -  Dark measurement started.
13:13:42.19  LSH      -     -     -     -  Dark measurement started.
13:13:42.20  USH      -     -     -     -  Dark measurement started.
13:13:42.95  SWS      -     -     -     -  Idling
13:13:43.38  USH      -     -     -     -  Idling
13:13:43.88  LSH      -     -     -     -  Idling
13:13:45.37  SWS      -     -     -     -  Dark measurement started.
13:13:45.38  LSH      -     -     -     -  Dark measurement started.
13:13:45.39  USH      -     -     -     -  Dark measurement started.
13:13:46.14  SWS      -     -     -     -  Idling
13:13:46.60  USH      -     -     -     -  Idling
13:13:47.06  LSH      -     -     -     -  Idling
13:13:48.12  USH      -     -     -     -  Dark measurement started.
13:13:48.13  LSH      -     -     -     -  Dark measurement started.
13:13:48.15  SWS      -     -     -     -  Dark measurement started.
13:13:48.91  USH      -     -     -     -  Idling
13:13:49.31  SWS      -     -     -     -  Idling
13:13:49.83  LSH      -     -     -     -  Idling
13:13:51.80  USH      -     -     -     -  Dark measurement started.
13:13:51.81  LSH      -     -     -     -  Dark measurement started.
13:13:51.84  SWS      -     -     -     -  Dark measurement started.
13:13:52.60  USH      -     -     -     -  Idling
13:13:53.03  SWS      -     -     -     -  Idling
13:13:53.50  LSH      -     -     -     -  Idling
13:13:58.72  USH      -     -     -     -  Manual scene recording started.
13:13:58.74  LSH      -     -     -     -  Manual scene recording started.
13:13:58.75  SWS      -     -     -     -  Manual scene recording started.
13:15:09.51  ---      -     -     -     -  *** 13 deg
13:15:16.06  SWS      -     -     -     -  Idling
13:15:16.07  LSH      -     -     -     -  Idling
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13:15:16.08  USH      -     -     -     -  Idling
13:15:18.10  SWS   -6.0     -     -     -  Telescope sent to 174.000
13:15:19.87  SWS  174.0     -     -     -  Telescope stopped.
13:15:21.55  SWS      -     -     -     -  Manual scene recording started.
13:15:21.56  LSH      -     -     -     -  Manual scene recording started.
13:15:21.57  USH      -     -     -     -  Manual scene recording started.
13:16:25.92  ---      -     -     -     -  *** run at 23000 ft
13:16:30.18  USH      -     -     -     -  Idling
13:16:30.21  LSH      -     -     -     -  Idling
13:16:30.25  SWS      -     -     -     -  Idling
13:16:36.97  SWS      -     -     -     -  Dark measurement started.
13:16:36.98  LSH      -     -     -     -  Dark measurement started.
13:16:37.00  USH      -     -     -     -  Dark measurement started.
13:16:37.75  SWS      -     -     -     -  Idling
13:16:38.18  USH      -     -     -     -  Idling
13:16:38.66  LSH      -     -     -     -  Idling
13:16:39.97  SWS      -     -     -     -  Dark measurement started.
13:16:39.98  LSH      -     -     -     -  Dark measurement started.
13:16:39.99  USH      -     -     -     -  Dark measurement started.
13:16:40.75  SWS      -     -     -     -  Idling
13:16:41.17  USH      -     -     -     -  Idling
13:16:41.73  LSH      -     -     -     -  Idling
13:16:42.90  SWS      -     -     -     -  Dark measurement started.
13:16:42.91  LSH      -     -     -     -  Dark measurement started.
13:16:42.95  USH      -     -     -     -  Dark measurement started.
13:16:43.67  SWS      -     -     -     -  Idling
13:16:44.08  USH      -     -     -     -  Idling
13:16:44.63  LSH      -     -     -     -  Idling
13:16:49.01  USH      -     -     -     -  Manual scene recording started.
13:16:49.01  LSH      -     -     -     -  Manual scene recording started.
13:16:49.04  SWS      -     -     -     -  Manual scene recording started.
13:18:59.96  ---      -     -     -     -  *** 13 deg
13:19:17.63  SWS  174.0     -     -     -  Telescope sent to -6.000
13:19:19.39  SWS   -6.0     -     -     -  Telescope stopped.
13:20:04.86  SWS      -     -     -     -  Idling
13:20:04.92  USH      -     -     -     -  Idling
13:20:04.96  LSH      -     -     -     -  Idling
13:20:09.86  LSH      -     -     -     -  Dark measurement started.
13:20:09.87  SWS      -     -     -     -  Dark measurement started.
13:20:09.89  USH      -     -     -     -  Dark measurement started.
13:20:10.85  SWS      -     -     -     -  Idling
13:20:11.08  USH      -     -     -     -  Idling
13:20:11.42  LSH      -     -     -     -  Idling
13:20:11.95  SWS      -     -     -     -  Dark measurement started.
13:20:11.95  LSH      -     -     -     -  Dark measurement started.
13:20:11.97  USH      -     -     -     -  Dark measurement started.
13:20:12.72  SWS      -     -     -     -  Idling
13:20:13.18  USH      -     -     -     -  Idling
13:20:13.69  LSH      -     -     -     -  Idling
13:20:14.63  SWS      -     -     -     -  Dark measurement started.
13:20:14.64  LSH      -     -     -     -  Dark measurement started.
13:20:14.66  USH      -     -     -     -  Dark measurement started.
13:20:15.43  SWS      -     -     -     -  Idling
13:20:15.87  USH      -     -     -     -  Idling
13:20:16.36  LSH      -     -     -     -  Idling
13:20:20.99  SWS   -6.0     -     -     -  Telescope sent to 174.000
13:20:22.75  SWS  174.0     -     -     -  Telescope stopped.
13:20:24.53  USH      -     -     -     -  Manual scene recording started.
13:20:24.54  LSH      -     -     -     -  Manual scene recording started.
13:20:24.55  SWS      -     -     -     -  Manual scene recording started.
13:21:21.17  ---      -     -     -     -  *** 14 deg
13:22:00.06  ---      -     -     -     -  *** cirrus above and stratocumulus sheet below
                                             still
13:25:36.99  ---      -     -     -     -  *** 13 deg
13:26:54.17  LSH      -     -     -     -  Idling
13:26:54.20  USH      -     -     -     -  Idling
13:26:54.21  SWS      -     -     -     -  Idling
13:27:01.33  USH      -     -     -     -  Dark measurement started.
13:27:01.34  LSH      -     -     -     -  Dark measurement started.
```

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13:27:01.35  SWS      -     -     -     -  Dark measurement started.
13:27:02.09  USH      -     -     -     -  Idling
13:27:02.51  SWS      -     -     -     -  Idling
13:27:03.00  LSH      -     -     -     -  Idling
13:27:04.22  USH      -     -     -     -  Dark measurement started.
13:27:04.23  LSH      -     -     -     -  Dark measurement started.
13:27:04.25  SWS      -     -     -     -  Dark measurement started.
13:27:04.98  USH      -     -     -     -  Idling
13:27:05.40  SWS      -     -     -     -  Idling
13:27:05.91  LSH      -     -     -     -  Idling
13:27:06.89  SWS      -     -     -     -  Dark measurement started.
13:27:06.89  LSH      -     -     -     -  Dark measurement started.
13:27:06.93  USH      -     -     -     -  Dark measurement started.
13:27:07.69  SWS      -     -     -     -  Idling
13:27:08.09  USH      -     -     -     -  Idling
13:27:08.61  LSH      -     -     -     -  Idling
13:27:21.03  SWS      -     -     -     -  Manual scene recording started.
13:27:21.04  LSH      -     -     -     -  Manual scene recording started.
13:27:21.06  USH      -     -     -     -  Manual scene recording started.
13:27:30.87  ---      -     -     -     -  *** 14 deg
13:28:31.30  LSH      -     -     -     -  Idling
13:28:31.32  USH      -     -     -     -  Idling
13:28:31.34  SWS      -     -     -     -  Idling
13:28:33.11  SWS  174.0     -     -     -  Telescope sent to -6.000
13:28:34.89  SWS   -6.0     -     -     -  Telescope stopped.
13:28:46.42  SWS      -     -     -     -  Dark measurement started.
13:28:46.43  LSH      -     -     -     -  Dark measurement started.
13:28:46.44  USH      -     -     -     -  Dark measurement started.
13:28:47.18  SWS      -     -     -     -  Idling
13:28:47.62  USH      -     -     -     -  Idling
13:28:48.13  LSH      -     -     -     -  Idling
13:28:48.94  SWS      -     -     -     -  Dark measurement started.
13:28:48.95  LSH      -     -     -     -  Dark measurement started.
13:28:48.96  USH      -     -     -     -  Dark measurement started.
13:28:49.69  SWS      -     -     -     -  Idling
13:28:50.19  USH      -     -     -     -  Idling
13:28:50.64  LSH      -     -     -     -  Idling
13:28:54.18  SWS      -     -     -     -  Manual scene recording started.
13:28:54.19  LSH      -     -     -     -  Manual scene recording started.
13:28:54.20  USH      -     -     -     -  Manual scene recording started.
13:30:16.86  LSH      -     -     -     -  Idling
13:30:16.91  SWS      -     -     -     -  Idling
13:30:16.93  USH      -     -     -     -  Idling
13:30:24.24  SWS      -     -     -     -  Dark measurement started.
13:30:24.24  LSH      -     -     -     -  Dark measurement started.
13:30:24.26  USH      -     -     -     -  Dark measurement started.
13:30:25.01  SWS      -     -     -     -  Idling
13:30:25.50  USH      -     -     -     -  Idling
13:30:25.95  LSH      -     -     -     -  Idling
13:30:31.13  SWS   -6.0     -     -     -  Telescope sent to 174.000
13:30:32.89  SWS  173.9     -     -     -  Telescope stopped.
13:30:33.70  USH      -     -     -     -  Manual scene recording started.
13:30:33.70  LSH      -     -     -     -  Manual scene recording started.
13:30:33.72  SWS      -     -     -     -  Manual scene recording started.
13:33:26.78  ---      -     -     -     -  *** 15 deg
13:36:20.21  ---      -     -     -     -  *** 14 deg
13:38:17.36  ---      -     -     -     -  ***
13:38:19.49  SWS  174.0     -     -     -  Telescope sent to -6.000
13:38:21.24  SWS   -6.0     -     -     -  Telescope stopped.
13:38:33.43  ---      -     -     -     -  *** cirrus above thickening
13:38:43.32  USH      -     -     -     -  Idling
13:38:43.34  LSH      -     -     -     -  Idling
13:38:43.36  SWS      -     -     -     -  Idling
13:38:49.88  USH      -     -     -     -  Dark measurement started.
13:38:49.89  LSH      -     -     -     -  Dark measurement started.
13:38:49.90  SWS      -     -     -     -  Dark measurement started.
13:38:50.70  USH      -     -     -     -  Idling
13:38:51.13  SWS      -     -     -     -  Idling
13:38:51.67  LSH      -     -     -     -  Idling
```

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13:38:52.70  SWS      -     -     -     -  Dark measurement started.
13:38:52.70  LSH      -     -     -     -  Dark measurement started.
13:38:52.72  USH      -     -     -     -  Dark measurement started.
13:38:53.50  SWS      -     -     -     -  Idling
13:38:53.88  USH      -     -     -     -  Idling
13:38:54.37  LSH      -     -     -     -  Idling
13:38:55.38  SWS      -     -     -     -  Dark measurement started.
13:38:55.40  LSH      -     -     -     -  Dark measurement started.
13:38:55.43  USH      -     -     -     -  Dark measurement started.
13:38:56.21  SWS      -     -     -     -  Idling
13:38:56.64  USH      -     -     -     -  Idling
13:38:57.17  LSH      -     -     -     -  Idling
13:39:04.21  USH      -     -     -     -  Manual scene recording started.
13:39:04.21  LSH      -     -     -     -  Manual scene recording started.
13:39:04.23  SWS      -     -     -     -  Manual scene recording started.
13:39:51.46  ---      -     -     -     -  *** sonde
13:40:56.44  LSH      -     -     -     -  Idling
13:40:56.46  USH      -     -     -     -  Idling
13:40:56.47  SWS      -     -     -     -  Idling
13:41:00.12  SWS   -6.0     -     -     -  Telescope sent to 174.000
13:41:01.91  SWS  174.0     -     -     -  Telescope stopped.
13:41:03.46  USH      -     -     -     -  Manual scene recording started.
13:41:03.48  SWS      -     -     -     -  Manual scene recording started.
13:41:03.51  LSH      -     -     -     -  Manual scene recording started.
13:46:29.01  ---      -     -     -     -  *** 13 deg
13:47:48.11  ---      -     -     -     -  *** 14 deg
13:48:12.25  LSH      -     -     -     -  Idling
13:48:12.29  SWS      -     -     -     -  Idling
13:48:12.32  USH      -     -     -     -  Idling
13:48:17.04  SWS  174.0     -     -     -  Telescope sent to -6.000
13:48:18.82  SWS   -6.0     -     -     -  Telescope stopped.
13:48:27.77  SWS      -     -     -     -  Dark measurement started.
13:48:27.79  LSH      -     -     -     -  Dark measurement started.
13:48:27.80  USH      -     -     -     -  Dark measurement started.
13:48:28.57  SWS      -     -     -     -  Idling
13:48:28.99  USH      -     -     -     -  Idling
13:48:29.53  LSH      -     -     -     -  Idling
13:48:31.89  SWS      -     -     -     -  Dark measurement started.
13:48:31.90  LSH      -     -     -     -  Dark measurement started.
13:48:31.91  USH      -     -     -     -  Dark measurement started.
13:48:32.66  SWS      -     -     -     -  Idling
13:48:33.10  USH      -     -     -     -  Idling
13:48:33.62  LSH      -     -     -     -  Idling
13:48:35.68  SWS      -     -     -     -  Dark measurement started.
13:48:35.69  LSH      -     -     -     -  Dark measurement started.
13:48:35.72  USH      -     -     -     -  Dark measurement started.
13:48:36.46  SWS      -     -     -     -  Idling
13:48:36.68  USH      -     -     -     -  Idling
13:48:37.59  LSH      -     -     -     -  Idling
13:48:41.49  SWS      -     -     -     -  Manual scene recording started.
13:48:41.49  LSH      -     -     -     -  Manual scene recording started.
13:48:41.51  USH      -     -     -     -  Manual scene recording started.
13:50:16.41  ---      -     -     -     -  *** sonde 4
13:51:10.84  SWS      -     -     -     -  Idling
13:51:10.85  LSH      -     -     -     -  Idling
13:51:10.86  USH      -     -     -     -  Idling
13:51:13.57  SWS   -6.0     -     -     -  Telescope sent to 174.000
13:51:15.36  SWS  174.0     -     -     -  Telescope stopped.
13:51:18.08  LSH      -     -     -     -  Manual scene recording started.
13:51:18.09  USH      -     -     -     -  Manual scene recording started.
13:51:18.12  SWS      -     -     -     -  Manual scene recording started.
13:53:52.73  ---      -     -     -     -  *** 15 deg
13:56:02.57  ---      -     -     -     -  *** 14 deg
13:58:22.23  LSH      -     -     -     -  Idling
13:58:22.25  SWS      -     -     -     -  Idling
13:58:22.27  USH      -     -     -     -  Idling
13:58:24.18  SWS  174.0     -     -     -  Telescope sent to -6.000
13:58:25.96  SWS   -6.0     -     -     -  Telescope stopped.
13:58:33.50  USH      -     -     -     -  Dark measurement started.
```

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13:58:33.50  LSH      -     -     -     -  Dark measurement started.
13:58:33.52  SWS      -     -     -     -  Dark measurement started.
13:58:34.27  USH      -     -     -     -  Idling
13:58:34.69  SWS      -     -     -     -  Idling
13:58:35.17  LSH      -     -     -     -  Idling
13:58:35.95  USH      -     -     -     -  Dark measurement started.
13:58:35.98  LSH      -     -     -     -  Dark measurement started.
13:58:35.98  SWS      -     -     -     -  Dark measurement started.
13:58:36.72  USH      -     -     -     -  Idling
13:58:37.16  SWS      -     -     -     -  Idling
13:58:37.64  LSH      -     -     -     -  Idling
13:58:38.81  SWS      -     -     -     -  Dark measurement started.
13:58:38.82  LSH      -     -     -     -  Dark measurement started.
13:58:38.83  USH      -     -     -     -  Dark measurement started.
13:58:39.59  SWS      -     -     -     -  Idling
13:58:39.99  USH      -     -     -     -  Idling
13:58:40.53  LSH      -     -     -     -  Idling
13:58:45.52  USH      -     -     -     -  Manual scene recording started.
13:58:45.54  LSH      -     -     -     -  Manual scene recording started.
13:58:45.55  SWS      -     -     -     -  Manual scene recording started.
14:00:41.83  ---      -     -     -     -  *** sonde 5
14:01:08.95  SWS      -     -     -     -  Idling
14:01:09.01  USH      -     -     -     -  Idling
14:01:09.05  LSH      -     -     -     -  Idling
14:01:19.79  SWS      -     -     -     -  Dark measurement started.
14:01:19.79  LSH      -     -     -     -  Dark measurement started.
14:01:19.83  USH      -     -     -     -  Dark measurement started.
14:01:20.58  SWS      -     -     -     -  Idling
14:01:20.78  USH      -     -     -     -  Idling
14:01:21.70  LSH      -     -     -     -  Idling
14:01:22.77  LSH      -     -     -     -  Dark measurement started.
14:01:22.78  USH      -     -     -     -  Dark measurement started.
14:01:22.80  SWS      -     -     -     -  Dark measurement started.
14:01:23.75  USH      -     -     -     -  Idling
14:01:23.97  SWS      -     -     -     -  Idling
14:01:24.30  LSH      -     -     -     -  Idling
14:01:29.42  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:01:31.20  SWS  174.0     -     -     -  Telescope stopped.
14:01:31.74  USH      -     -     -     -  Manual scene recording started.
14:01:31.74  LSH      -     -     -     -  Manual scene recording started.
14:01:31.77  SWS      -     -     -     -  Manual scene recording started.
14:04:36.00  ---      -     -     -     -  *** 13 deg
14:08:33.41  SWS      -     -     -     -  Idling
14:08:33.44  LSH      -     -     -     -  Idling
14:08:33.47  USH      -     -     -     -  Idling
14:08:36.05  SWS  174.0     -     -     -  Telescope sent to -6.000
14:08:37.85  SWS   -6.0     -     -     -  Telescope stopped.
14:08:49.05  SWS      -     -     -     -  Dark measurement started.
14:08:49.07  LSH      -     -     -     -  Dark measurement started.
14:08:49.07  USH      -     -     -     -  Dark measurement started.
14:08:50.02  USH      -     -     -     -  Idling
14:08:50.25  SWS      -     -     -     -  Idling
14:08:50.56  LSH      -     -     -     -  Idling
14:08:52.33  USH      -     -     -     -  Dark measurement started.
14:08:52.35  LSH      -     -     -     -  Dark measurement started.
14:08:52.37  SWS      -     -     -     -  Dark measurement started.
14:08:53.11  USH      -     -     -     -  Idling
14:08:53.54  SWS      -     -     -     -  Idling
14:08:54.05  LSH      -     -     -     -  Idling
14:08:55.36  SWS      -     -     -     -  Dark measurement started.
14:08:55.37  LSH      -     -     -     -  Dark measurement started.
14:08:55.39  USH      -     -     -     -  Dark measurement started.
14:08:56.14  SWS      -     -     -     -  Idling
14:08:56.59  USH      -     -     -     -  Idling
14:08:57.06  LSH      -     -     -     -  Idling
14:09:02.24  USH      -     -     -     -  Manual scene recording started.
14:09:02.25  LSH      -     -     -     -  Manual scene recording started.
14:09:02.26  SWS      -     -     -     -  Manual scene recording started.
14:09:10.93  ---      -     -     -     -  *** 13 deg
```

14:11:14.62	---	-	-	-	-	*** sonde 6
14:12:03.90	USH	-	-	-	-	Idling
14:12:03.93	SWS	-	-	-	-	Idling
14:12:03.97	LSH	-	-	-	-	Idling
14:12:10.76	USH	-	-	-	-	Dark measurement started.
14:12:10.77	LSH	-	-	-	-	Dark measurement started.
14:12:10.79	SWS	-	-	-	-	Dark measurement started.
14:12:11.54	USH	-	-	-	-	Idling
14:12:11.97	SWS	-	-	-	-	Idling
14:12:12.45	LSH	-	-	-	-	Idling
14:12:13.06	SWS	-	-	-	-	Dark measurement started.
14:12:13.07	LSH	-	-	-	-	Dark measurement started.
14:12:13.09	USH	-	-	-	-	Dark measurement started.
14:12:13.82	SWS	-	-	-	-	Idling
14:12:14.23	USH	-	-	-	-	Idling
14:12:14.77	LSH	-	-	-	-	Idling
14:12:15.57	SWS	-	-	-	-	Dark measurement started.
14:12:15.58	LSH	-	-	-	-	Dark measurement started.
14:12:15.59	USH	-	-	-	-	Dark measurement started.
14:12:16.35	SWS	-	-	-	-	Idling
14:12:16.78	USH	-	-	-	-	Idling
14:12:17.28	LSH	-	-	-	-	Idling
14:12:22.79	SWS	-6.0	-	-	-	Telescope sent to 174.000
14:12:24.56	SWS	174.0	-	-	-	Telescope stopped.
14:12:25.11	SWS	-	-	-	-	Manual scene recording started.
14:12:25.12	LSH	-	-	-	-	Manual scene recording started.
14:12:25.13	USH	-	-	-	-	Manual scene recording started.
14:13:46.90	---	-	-	-	-	*** 12 deg
14:15:03.51	---	-	-	-	-	*** 13 deg
14:17:30.74	---	-	-	-	-	*** stratocumulus sheet thinning below
14:17:45.08	---	-	-	-	-	*** getting large breaks in cloud
14:19:36.45	SWS	-	-	-	-	Idling
14:19:36.48	USH	-	-	-	-	Idling
14:19:36.54	LSH	-	-	-	-	Idling
14:19:40.00	SWS	174.0	-	-	-	Telescope sent to -6.000
14:19:41.78	SWS	-5.9	-	-	-	Telescope stopped.
14:19:51.91	USH	-	-	-	-	Dark measurement started.
14:19:51.92	LSH	-	-	-	-	Dark measurement started.
14:19:51.95	SWS	-	-	-	-	Dark measurement started.
14:19:52.71	USH	-	-	-	-	Idling
14:19:53.11	SWS	-	-	-	-	Idling
14:19:53.68	LSH	-	-	-	-	Idling
14:19:57.18	SWS	-	-	-	-	Dark measurement started.
14:19:57.19	LSH	-	-	-	-	Dark measurement started.
14:19:57.20	USH	-	-	-	-	Dark measurement started.
14:19:57.94	SWS	-	-	-	-	Idling
14:19:58.38	USH	-	-	-	-	Idling
14:19:58.87	LSH	-	-	-	-	Idling
14:20:00.03	USH	-	-	-	-	Dark measurement started.
14:20:00.04	SWS	-	-	-	-	Dark measurement started.
14:20:00.06	LSH	-	-	-	-	Dark measurement started.
14:20:00.79	USH	-	-	-	-	Idling
14:20:01.07	SWS	-	-	-	-	Idling
14:20:01.91	LSH	-	-	-	-	Idling
14:20:06.12	USH	-	-	-	-	Manual scene recording started.
14:20:06.13	LSH	-	-	-	-	Manual scene recording started.
14:20:06.15	SWS	-	-	-	-	Manual scene recording started.
14:20:17.15	---	-	-	-	-	*** 14 deg
14:21:21.50	---	-	-	-	-	*** sonde 7
14:22:05.82	LSH	-	-	-	-	Idling
14:22:05.83	USH	-	-	-	-	Idling
14:22:05.84	SWS	-	-	-	-	Idling
14:22:14.04	USH	-	-	-	-	Dark measurement started.
14:22:14.05	LSH	-	-	-	-	Dark measurement started.
14:22:14.08	SWS	-	-	-	-	Dark measurement started.
14:22:14.84	USH	-	-	-	-	Idling
14:22:15.03	SWS	-	-	-	-	Idling
14:22:15.85	SWS	-	-	-	-	Dark measurement started.
14:22:15.85	USH	-	-	-	-	Dark measurement started.

```
14:22:15.97  LSH      -     -     -     -  Idling
14:22:16.07  LSH      -     -     -     -  Dark measurement started.
14:22:16.69  SWS      -     -     -     -  Idling
14:22:16.88  USH      -     -     -     -  Idling
14:22:17.80  LSH      -     -     -     -  Idling
14:22:18.67  SWS      -     -     -     -  Dark measurement started.
14:22:18.68  LSH      -     -     -     -  Dark measurement started.
14:22:18.69  USH      -     -     -     -  Dark measurement started.
14:22:19.47  SWS      -     -     -     -  Idling
14:22:19.87  USH      -     -     -     -  Idling
14:22:20.37  LSH      -     -     -     -  Idling
14:22:25.70  SWS   -6.0     -     -     -  Telescope sent to -6.000
14:22:26.64  SWS   -6.0     -     -     -  Telescope sent to 174.000
14:22:28.39  SWS  174.0     -     -     -  Telescope stopped.
14:22:30.68  SWS      -     -     -     -  Manual scene recording started.
14:22:30.69  LSH      -     -     -     -  Manual scene recording started.
14:22:30.71  USH      -     -     -     -  Manual scene recording started.
14:23:12.19  ---      -     -     -     -  *** 14 deg
14:23:47.21  ---      -     -     -     -  *** 13 deg
14:24:15.81  ---      -     -     -     -  *** strat sheet almost completely broken up
                                             now below
14:25:10.15  ---      -     -     -     -  *** end of run
14:25:33.03  ---      -     -     -     -  *** profile descent (19) into Arica
14:27:47.08  ---      -     -     -     -  *** more cloud below
14:27:58.82  ---      -     -     -     -  *** solid strat sheet
14:28:15.66  ---      -     -     -     -  *** still cirrus above
14:28:29.69  USH      -     -     -     -  Idling
14:28:29.70  SWS      -     -     -     -  Idling
14:28:29.76  LSH      -     -     -     -  Idling
14:28:29.79  LSH      -     -     -     -  Idling
14:28:31.31  SWS  174.0     -     -     -  Telescope sent to -6.000
14:28:33.13  SWS   -6.0     -     -     -  Telescope stopped.
14:28:40.04  SWS      -     -     -     -  Dark measurement started.
14:28:40.05  LSH      -     -     -     -  Dark measurement started.
14:28:40.06  USH      -     -     -     -  Dark measurement started.
14:28:40.86  SWS      -     -     -     -  Idling
14:28:41.30  USH      -     -     -     -  Idling
14:28:41.82  LSH      -     -     -     -  Idling
14:28:42.89  SWS      -     -     -     -  Dark measurement started.
14:28:42.90  LSH      -     -     -     -  Dark measurement started.
14:28:42.91  USH      -     -     -     -  Dark measurement started.
14:28:43.67  SWS      -     -     -     -  Idling
14:28:44.09  USH      -     -     -     -  Idling
14:28:44.59  LSH      -     -     -     -  Idling
14:28:45.25  LSH      -     -     -     -  Dark measurement started.
14:28:45.25  USH      -     -     -     -  Dark measurement started.
14:28:45.29  SWS      -     -     -     -  Dark measurement started.
14:28:46.21  USH      -     -     -     -  Idling
14:28:46.44  SWS      -     -     -     -  Idling
14:28:46.76  LSH      -     -     -     -  Idling
14:28:51.20  SWS      -     -     -     -  Manual scene recording started.
14:28:51.21  LSH      -     -     -     -  Manual scene recording started.
14:28:51.23  USH      -     -     -     -  Manual scene recording started.
14:29:56.99  ---      -     -     -     -  *** 15 deg
14:31:27.96  ---      -     -     -     -  *** 14 deg
14:38:29.97  ---      -     -     -     -  *** cloud breaking up below again
14:41:23.65  ---      -     -     -     -  *** 13 deg
14:41:46.46  ---      -     -     -     -  *** passing through a moist layer
14:42:01.57  ---      -     -     -     -  *** highidh scattering from neph
14:43:12.27  ---      -     -     -     -  *** run
14:43:24.67  ---      -     -     -     -  *** interupted profile
14:43:33.44  ---      -     -     -     -  *** 14 deg
14:44:33.12  ---      -     -     -     -  *** clear below cirrus above
14:48:03.64  ---      -     -     -     -  *** 15 deg
14:49:25.89  USH      -     -     -     -  Idling
14:49:25.99  LSH      -     -     -     -  Idling
14:49:26.01  SWS      -     -     -     -  Idling
14:49:32.33  SWS      -     -     -     -  Dark measurement started.
14:49:32.35  LSH      -     -     -     -  Dark measurement started.
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14:49:32.36	USH	-	-	-	-	Dark measurement started.
14:49:33.11	SWS	-	-	-	-	Idling
14:49:33.54	USH	-	-	-	-	Idling
14:49:34.03	LSH	-	-	-	-	Idling
14:49:36.51	USH	-	-	-	-	Dark measurement started.
14:49:36.53	LSH	-	-	-	-	Dark measurement started.
14:49:36.54	SWS	-	-	-	-	Dark measurement started.
14:49:37.28	USH	-	-	-	-	Idling
14:49:37.71	SWS	-	-	-	-	Idling
14:49:38.23	LSH	-	-	-	-	Idling
14:49:39.64	LSH	-	-	-	-	Dark measurement started.
14:49:39.64	SWS	-	-	-	-	Dark measurement started.
14:49:39.67	USH	-	-	-	-	Dark measurement started.
14:49:40.62	SWS	-	-	-	-	Idling
14:49:40.84	USH	-	-	-	-	Idling
14:49:41.17	LSH	-	-	-	-	Idling
14:49:48.65	USH	-	-	-	-	Manual scene recording started.
14:49:48.66	LSH	-	-	-	-	Manual scene recording started.
14:49:48.70	SWS	-	-	-	-	Manual scene recording started.
14:50:00.88	---	-	-	-	-	*** 14 deg
14:52:34.78	SWS	-	-	-	-	Warning: Clipping may be occurring.
14:52:35.45	---	-	-	-	-	*** 15 deg
14:52:57.73	---	-	-	-	-	*** turning into sun
15:10:23.25	USH	-	-	-	-	Idling
15:10:23.25	SWS	-	-	-	-	Idling
15:10:23.32	LSH	-	-	-	-	Idling
15:10:28.27	SWS	-	-	-	-	Dark measurement started.
15:10:28.28	LSH	-	-	-	-	Dark measurement started.
15:10:28.30	USH	-	-	-	-	Dark measurement started.
15:10:29.04	SWS	-	-	-	-	Idling
15:10:29.48	USH	-	-	-	-	Idling
15:10:29.98	LSH	-	-	-	-	Idling
15:10:31.61	SWS	-	-	-	-	Dark measurement started.
15:10:31.62	LSH	-	-	-	-	Dark measurement started.
15:10:31.63	USH	-	-	-	-	Dark measurement started.
15:10:32.41	SWS	-	-	-	-	Idling
15:10:32.89	USH	-	-	-	-	Idling
15:10:33.40	LSH	-	-	-	-	Idling
15:10:35.87	SWS	-	-	-	-	Dark measurement started.
15:10:35.89	LSH	-	-	-	-	Dark measurement started.
15:10:35.92	USH	-	-	-	-	Dark measurement started.
15:10:36.71	SWS	-	-	-	-	Idling
15:10:37.10	USH	-	-	-	-	Idling
15:10:37.61	LSH	-	-	-	-	Idling
15:10:42.62	USH	-	-	-	-	Manual scene recording started.
15:10:42.63	LSH	-	-	-	-	Manual scene recording started.
15:10:42.64	SWS	-	-	-	-	Manual scene recording started.

Pre-Flighter's Log

Date: 4/11/08 Flight No: B 414 Pre-Flighter: KFT.

No.	√ or x	Location	Action	Comments
1		Hangar	Collect spanners for core chem	
		Aircraft Cabin: Power-up		
2	DA	Core Chemistry	Gases x 3 ON	
3	✓	Cabin	All Racks Checked	
4	DA	Core Chemistry	Instruments Checked OK	
5	DA	Core Chemistry	CO Flows Checked OK	
6	✓	Aft CorCon	All reqd CBs made	
7	✓	Fore CorCon	CBs made, PCs ON	
8	✓	HORACE	Optical Disk loaded	
9	✓	HORACE	Recording data	
10	✓	HORACE	DLU Status Checked	
11	✓	HORACE	HORACE Status Checked	
12	✓	Satcom H	Power LED ON	
13	✓	Nevzorov	Checked and OFF	
14	✓	Cameras Pictures	Checked x 4 OK	
15	✓	Video Laptop	Checked onboard	
16	X	FWVS	Set up & check on **AUTO**	
17	✓	Delced Rosemount	Heater Checked then OFF	
18	✓	Heimann	Calibration Checked	
19	✓	TWC	Fitted & signals checked	
20	✓	GE	Balance checked then back to DP	
21	✓	GPS (XR5M)	Checked	
22	✓	Satcom C	Checked	
23	X	Video x 2	Records okay, Rewind	

No.	√ or x	Location	Action	Comments
24	✓	Miss. Sci Laptop	Checked Onboard	In cockpit
25	X	CNC	Butanol filled	
26	DT	Dry Neph	Power up & Zero Cal	
27	DT	PSAP	Pre-flight log actions complete	
28	X	CGPS	CBs and PC ON	
		External Checks		
29	✓	Turb Probe	Clean if reqd, Photo taken	
30	✓	JW	Cleaned & Checked	
31	✓	DI Rosemount	Cleaned & Checked	
32	✓	NDI Rosemount	Cleaned & Checked	
33	✓	Nevzorov	Cleaned/windings checked	
34	✓	GE	Cleaned & Checked	
35	✓	Lower BBRs	Domes cleaned/checked	
36	✓	Camera Windows	Cleaned	
37	✓	Heimann	Lens checked OK	residue dotson lens
38	✓	TWC Cover	Fitted if required	
39	✓	All other covers	Removed	
40		Pre-flight Bag	Returned to hold	** Check no butanol**
41		Tools	Check ALL in Toolkit	
42		Tools	Avalon informed	

		Avalon Checks	Signed
44	✓	Upper BBRs Checked & Cleaned	2/11/08
45	✓	ICEX applied	
46	✓	Turb Probe - Traps emptied, detail contents -	a)Nil b)1-2 drops c)1/4 full or more
47	✓	Turb Probe - Traps dried and resealed	

MISSING LOG SHEETS:

The following log sheets are not available for flight B414:

Log	Reason
Instrument Status	may not be correct – Flight Manager asked to check (PAN green on Inst Status but otherwise no evidence of it being operated
Cloud Physics Processing	No cloud physics processing logs are expected for VOCALS flights
Core Chemistry / TDLAS	no In Flight log except in cases of instrument problems
CCN	The CCN operator does not create a log sheet
2D-S / CAPS / SP2 / CPI	2D-S / CAPS / SP2 / CPI operator does not create a log sheet
AMS log	AMS operator does not create a log sheet
VACC	Operator does not create a log sheet

Document control

Revision	Date	Author	Comments
r0	15 Sep 2009	Doug Anderson	Initial version missing the above noted logs
r1			
r2			

Digital video recordings in avi format:

faam-video-dfc_faam_20081104_r0_b414_092941_1hz.avi
faam-video-dfc_faam_20081104_r0_b414_102941_1hz.avi
faam-video-dfc_faam_20081104_r0_b414_112941_1hz.avi
faam-video-dfc_faam_20081104_r0_b414_122941_1hz.avi
faam-video-dfc_faam_20081104_r0_b414_132941_1hz.avi
faam-video-dfc_faam_20081104_r0_b414_142941_1hz.avi

faam-video-rfc_faam_20081104_r0_b414_092926_1hz.avi
faam-video-rfc_faam_20081104_r0_b414_102926_1hz.avi
faam-video-rfc_faam_20081104_r0_b414_112926_1hz.avi
faam-video-rfc_faam_20081104_r0_b414_122926_1hz.avi
faam-video-rfc_faam_20081104_r0_b414_132926_1hz.avi
faam-video-rfc_faam_20081104_r0_b414_142926_1hz.avi

faam-video-ffc_faam_20081104_r0_b414_092920_1hz.avi
faam-video-ffc_faam_20081104_r0_b414_102920_1hz.avi
faam-video-ffc_faam_20081104_r0_b414_112920_1hz.avi
faam-video-ffc_faam_20081104_r0_b414_122920_1hz.avi
faam-video-ffc_faam_20081104_r0_b414_132920_1hz.avi
faam-video-ffc_faam_20081104_r0_b414_142920_1hz.avi

faam-video-ufc_faam_20081104_r0_b414_092933_1hz.avi
faam-video-ufc_faam_20081104_r0_b414_102933_1hz.avi
faam-video-ufc_faam_20081104_r0_b414_112933_1hz.avi
faam-video-ufc_faam_20081104_r0_b414_122933_1hz.avi
faam-video-ufc_faam_20081104_r0_b414_132933_1hz.avi
faam-video-ufc_faam_20081104_r0_b414_142933_1hz.avi

No Digital8 video recordings were made on this flight.